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Ownership of Toll Lines.

Reports from Ohio dealing with the proposed plans for enlarging the influence of local companies in their big connecting ally, the U. S. Long Distance Telephone Company, indicate the advance of a movement which from the first seemed to be aimed in the right direction. When the plan is finally worked out, we look, in the first place, for representation which will not only make for development along the line which will produce a growth of business, with correspondingly larger profits, for the long-distance company and all its local allies. A secondary result is almost sure to be even more effective co-operation between local companies themselves than we have seen in Ohio during the past. Well organized as are the Independents of that state, a direct insight into the methods of conducting long-distance business on a large scale cannot fail to unite them more thoroughly by the common interest in and comprehension of a business enterprise whose conduct affects the entire body.

It is generally agreed that economical long-distance development can only be obtained by the enforcement of a plan covering a considerable area. This creates the condition, for the Independent telephone companies, that they must, for their own best advantage, entrust the planning of the conduct of long-distance business to an organization in a position to cover the entire state, or at least a large part of it.

By expert knowledge and advice, officers of clearing houses have been able to do much to further the development of toll systems on sound, economical lines. But although we have no entire state which completely illustrates the point, we believe that close observers of different fields will agree in the statement that, unless a clearing house committee has influence with at least one powerful long distance company, development is liable to limp in its progress, making a general system with weak spots, which are a constant source of annoyance. This condition arises from the inability of members of a small group of local organizations to agree, among themselves and neighbors, upon a best plan, and execute it.

Such situations as have just been rather indefinitely suggested have caused the gradual strengthening of the opinion that long-distance business should be handled by purely long-distance companies, each covering a very considerable area; and that groups of companies needing short haul toll

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lines to reach heavy circuits to points over a hundred miles distant, may best serve their own interests through carrying on a toll business in a separate organization, under their joint control. Under such a system an essential for success is that local companies participate in ownership of the long-distance company, and have a keen interest in its economical and profitable operation as an entirely separate concern.

The management of a long-distance company under conlow way exchanges to cut in at will on circuits which trol of this type will be able to resist the temptation to alshould be reserved for long haul business, and will build only such lines as will prove, broadly considered, to fit into the general scheme of a system which, while sufficiently comprehensive to fulfill the obligations of a public service corporation to the people, shall nevertheless avoid the errors which would commit a profitable field for investment to the support of a doubtful financial proposition by building too many short haul lines.

If one were called upon to make a tentative summary of the effects of different types of ownership of long-distance lines, he might say that, in any large district, ownership entirely by local companies of lines radiating from their respective exchanges is likely to be disastrous, because it precludes the possibility of an extended long-distance service, and involves an investment so high that possible earnings could not even pay fixed charges; ownership by a long-distance company entirely independent of local companies, or persons largely interested in them, leads to an arrogant policy, or one tending toward the absorption into the treasury of the toll company of the assets of any local company persisting even in proper contentions against plans often arbitrarily determined; ownership by a long-distance company whose securities are heavily owned by local companies, or persons financially interested in them, and with its directorate including broad-gaged men who can consider any proposition from the viewpoint of the local company as well as the long-distance company, will produce due profits on long-distance business, and enlarge the profits of local exchanges, while giving the public a far better service than either of the other two other types of control which have been mentioned.

The Pessimist and the Service.

We read and hear much about optimism and the optimist. The quality and the individual are extolled "ad libitum," and in the process enough hot air is generated to warm a cozy flat for the winter. Nobody ever says anything against an optimist; it wouldn't be nice. We are all too busy stepping along in a rut, and treading on each others' heels, for independent thought; so when we read about the bright smile and breast full of hope of the optimist, we sink into inactive romanticism and accept it with swelling heart and tearful eye—it is so beautiful! These optimistic lucubrations are more worthy of extreme youth than mature experience. Let us turn on the light of common sense and see if the optimist is the great world-mover and river incendiary that he is pictured.

When confronted by difficulties, does the optimist smile cheerfully and heave hard with his broad shoulders? Not on your life! He smiles and then lets his cheerful optimism itself care for the situation. His doctrine is that of "Laissez faire" and "Mañana." The pessimist, on the contrary, when met with opposition, material or personal, draws down his mouth, spits on his hands, and says something like, "Ye won't, hey? well durn ye, I'll make ye." Then with a few well directed swats the machine is made to go, or the human is licked into line.

Who braces up the telephone service?—the optimist who takes his receiver off the hook, waits a minute or a minute and a half, smiles and thinks, "Perhaps the poor girl is busy," and finally gets his number and goes on his way. Or is it the pessimist, who, when he gets a slow answer, hollers. "Gimme the Information Operator," "Gimme the Chief Operator," "Gimme the Manager," and then says, "Say, your service is rotten; I had to wait thirty seconds for the operator." That is the man who calls attention to the service, and it is braced up for him.

An intoxicated son of Erin once stood at the entrance to a street car, gallantly waving the men in the crowd back and saying, "Ladiesh firsht, Ladiesh firsht," and when the crowd had entered, followed unsteadily after; and, like many another philanthropist, stood up hanging to a strap all the way home.

The pessimist has a better working knowledge of human nature than the optimist, for he knows that selfishness and fear are among its most powerful motives. Far from its being a sin to look out for one's self, it is a duty, followed in order by care for the family and then for humanity. If a person fails to care for himself, the chance that some optimist will is very remote, and he will probably land in one of those two optimistic resorts, the almshouse or the grave. It is good to be kind to your fellow-men, but to be trustingly confiding is foolish.

Alice Hegan Rice, in her story of "Mr. Opp," for which read Mister Optimist, has the optimist lashed to the mast and shrieking to be saved. Mr. Opp is a diligent, honest, uneducated, inflated citizen who has tried a dozen different things and succeeded at nothing, always with a bright smile. Result, failure to make money in the only chance he ever had, loss of the girl he loves to another, who is more or less pessimistic, and a future with only his half crazy sister for a companion.

As for the pessimist's influence on the telephone business, it is enormous, for his complaints are a pretty accurate barometer of service conditions, telling from day to day of a satisfied or dissatisfied public. In getting his own rights, he obtains justice for the silent optimists.

Howsoever, and notwithstanding, God bless the man who says, "The service is fine," who understands that good telephone service is not a constant, and may be good while varying considerably. The man who helps is the properly constituted optimistic pessimist, one who does not expect impossibilities of frail human nature, and yet understands it sufficiently to keep trying to bring out the best that there is in it; and when he finds no best there, philosophically recurs to his pessimistic attitude of not expecting to find it, and optimistically resumes the search again.

"Crystallization" of Lead Cable Armor

By Bruce V. Hill

When a metal is subjected to stresses which vary in direction, or to vibration, it is found to disintegrate more or less rapidly. The structure becomes granular, cracks appear and the metal is said to have "crystallized." If one bends a metal wire to and fro a number of times it "crystallizes," and eventually breaks. Parts of machines often break in this way on account of vibration. The most troublesome appearance of "crystallization" in a telephone plant is in the disintegration of cable armor in aerial cables. The sheath of a cable suspended from a vibrating structure of any kind disintegrates very rapidly. The writer has in mind one short length of cable which it was necessary to hang from a viaduct where the vibration is very great, and which has had to be replaced several times on this account. A cable swinging in the wind, especially if coming in contact with the branches of trees, is also likely to "crystallize." The quotation marks are here used advisedly because there is good reason to believe that it is not a phenomenon of crystallization at all. This will be referred to more fully later.

A cable, suspended in the ordinary manner from a messenger strand, will vibrate much as would a violin or piano string. The part of the cable between the hangers vibrates as a whole, in halves, in thirds, etc. Fig. 1* shows the vibration as a whole and in thirds. The points of no motion, represented in the figure where the wave curve crosses the axis, or line of normal position of the cable, are called *nodes*. The intermediate lengths are called *anti-nodes*. Unless one is used to thinking of the superposition of motions, it may be a little difficult at first to imagine a body vibrating in several ways, that is, with several different periods, at the same time. Such vibrations are common, however. In fact, it is hard to get any other kind. A suspended cable will follow the same law of vibration as a piano string, and we may take our illustrations from the latter. Strike the note *c* for example, keeping the sustaining pedal down. The *c* will be the most prominent note heard but, at the same time, *c'*, *g'*, *c''*, etc., will be distinct. These are called the overtones, or harmonics of the *c*. It is their presence which gives quality or color to the tone. An absolutely pure tone is seldom obtained. A good tuning-fork gives a nearly pure tone. Returning to the vibrating cable, the swinging of the whole section between supports corresponds to the fundamental, the *c* in the above illustration. The vibration in thirds, shown in the figure, corresponds to the *g'*.

When the cable vibrates in this manner, the portions

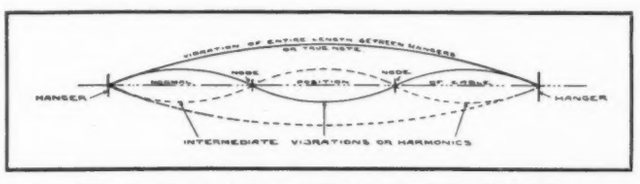


Fig. 1—Characteristic Vibrations of Lead Cable.

between the nodes, or points of rest, are alternately stretched and compressed, and this will tend to break the armor just as it would if one were to bend it in his hands, only much more slowly on account of the small amplitude of the motion. The break will naturally occur along the boundaries of crystals, but, as will be seen in the examination of the photographs, there is no tendency of the metal to break up into any new crystal form. All metals are crystalline in structure, and it is an error to suppose that they are amorphous until some external influence causes them to crystallize. There are substances of which this is true. Glass, for example, is amorphous, but will at times crystallize when improperly heated.

There are some properties of alloys to which we will

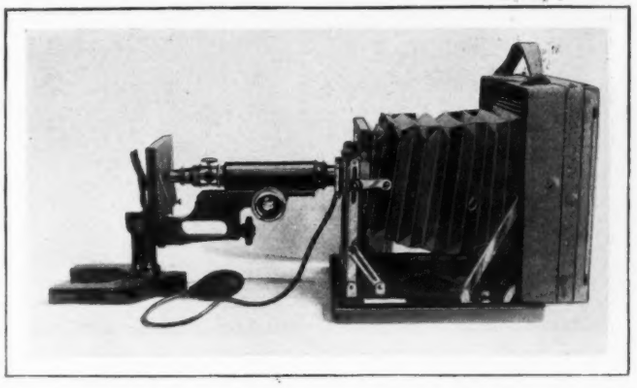


Fig. 2—Combination of Microscope and Camera for Photographing Structure of Metal.

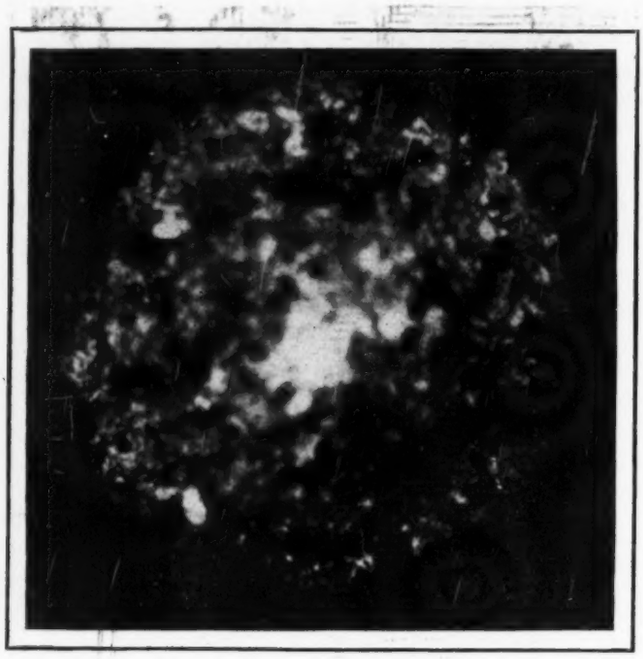
need to refer in describing the photographs, and which also render valuable such mixed metals for solders. For simplicity we will consider only binary alloys. In any series of alloys of two given metals there is always a certain alloy of definite proportions, which solidifies, or melts, at a lower temperature than any other alloy of these metals. This is called the eutetic, "well melting," alloy. In the case of lead and tin the eutetic alloy contains 70 per cent of lead and 30 per cent of tin. If more lead than 70 per cent be present in a mass of the melted alloy, the lead will solidify out first until the proportion of 70 to 30 is reached, when the whole mass will become hard. If the tin be in excess of the proper ratio it will crystallize out first. In ordinary solder this is the case. At any temperature then, between that at which the tin first begins to solidify and that at which the whole mass of the metal becomes hard, one has the crystals of tin mixed with the liquid eutetic in a pasty mass which can be "wiped."

Before proceeding to the discussion of the photographs it may be of interest to describe the apparatus and methods used in securing them. *Metallography* is a comparatively new art, having been practiced only about ten years, and being generally known for a much shorter time. The microscope was first applied to the study of the structure of the steels, and the French were the pioneers in this field. The work has been carried on by men in Germany, England and America and now every important steel company has a metallographic laboratory. It has been found that the microscopic examination of metals gives information as valuable as chemical analysis or physical and mechanical tests. The improvements in the art of tempering steel as well as the development of the self hardening and high-speed steels, are results of this newer study in which the microscope has played a very important part. As an example, it is said that, a few years ago, an expert workman on razor-blades could generally get but irregular results, some of his blades being good and others poor. Now a less practiced mechanic can secure uniformly

*Reproduced from a paper by Mr. Thomas G. Spencer, as published in Telephony of Feb. 20, 1909.

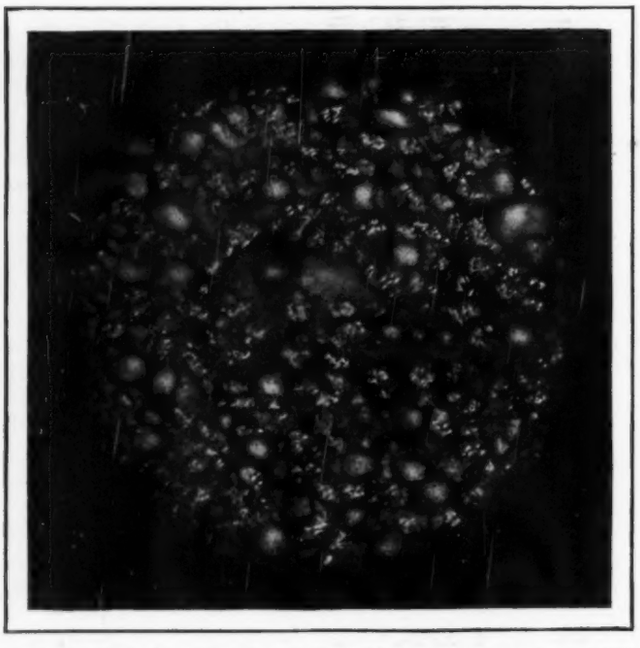
good results, because he is guided less by "rule of thumb," and more by science.

In studying the micro-structure of a metal, the first and



Specimen No. 1—Micrograph Shows Structure of Sample of Commercially Pure Lead Sheath.

perhaps the most difficult thing is the preparation of the specimen. A small piece of the metal is cemented to a block of glass or other firm substance in order that it may be held securely. It is then polished with several grades of emery, beginning with the coarsest and working down till the finishing is done on a fine piece of cloth or leather covered with the finest rouge. The specimen, when completed, must be plane and free from minute scratches. If the structure is very pronounced the specimen can now be



Specimen No. 2—Showing Structure of Sample Containing a Little Over 3 Per Cent of Tin.

examined under the microscope. As a rule, however, some method must be used to bring out the structure more clearly. The surface of the metal may be etched with dilute acid. In the case of an alloy, the acid will attack the different ingredients differently, and in the case of any metal, the crystals will be attacked in different degrees in different directions. Sometimes the structure can be intensified by gently heating the surface. A film of oxide will be formed which will be different on the various ingredients. Lead is one of the most difficult metals to prepare, for it is so soft that no true polish is possible. When the process has been carried as far as possible, the surface has a greasy appearance which obscures the true structure altogether. One must then resort to rather deep etching with acids. Nitric acid attacks lead very readily and, if tin be present, forms a coating of white oxide over the surface of the latter metal. If hydrochloric acid is employed, the lead will be attacked very slightly but left with a coating of white chloride over it, while the tin, if present, will be eaten away. In the preparation of the specimens of which photographs are reproduced, nitric acid was used in the etching except in the case of No. 3, where hydrochloric acid was employed to bring out the antimony a little more clearly.

In the common uses of the microscope, the objects examined are transparent and the light is reflected up

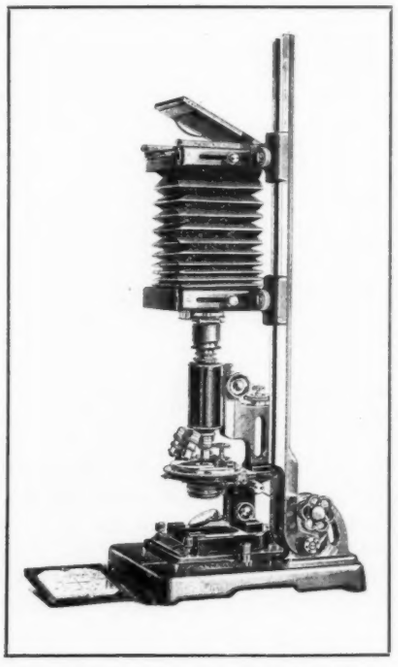


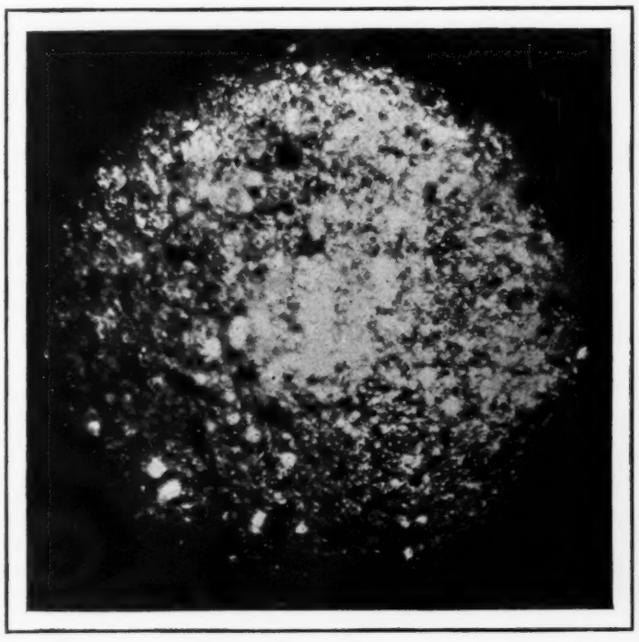
Fig. 3—Usual Equipment for Obtaining Micrographs.

through the slide by a mirror placed below the stage of the microscope. When opaque substances like metals are studied this is impossible. The light is then sent down onto the object by a *vertical illuminator*. The simplest form of vertical illuminator is merely a piece of thin, plane glass, mounted in a brass collar between the objective and the tube of the microscope. This collar with the screw for adjusting the plane of the glass, and the circular hole for admitting the light, is shown in Fig. 3. Light from a lamp is converged on this circular opening by means of a lens. The glass of the illuminator is set at an angle of about 45 degrees and reflects the light down upon the object under the microscope. There is a good deal of light reflected back by the upper surfaces of the objective lenses and this tends to make photographs less perfect.

When a portion of the specimen suitable for photographing is found and adjusted under the glass, the eyepiece is removed and the camera put in its place. Fig. 3,

which is used by the courtesy of Bausch and Lomb, shows one of the best types of micrographic apparatus. If one is not so fortunate as to have the use of anything of this sort, however, a good microscope and a camera can be used as shown in Fig. 2. The lenses are removed from the camera, leaving the shutter to control the exposure. The objective of the microscope forms the image directly on the plate in the camera. When the structure of the metal surface is marked by differences of color, the photograph may bring out this structure even more plainly than it appears to the eye, using the microscope. If the color contrasts are very slight and the structure marked principally by the shape of the crystals, it is difficult to reproduce this photographically. In the specimens here illustrated, where there were deep cracks or where the structure is very well marked, as in the alloys, the structure came out very plainly. Where the metal consisted of compact crystals, all of the same metal, the matter was more difficult.

The specimens of which photographs are given were selected from a large number examined. The surface represented in the photographs was, unmagnified, about the size of a blunt pin point. They were made by different manufacturers and were of various ages. No. 1 is a micro-



Specimen No. 3—Contains a Little Over 2 Per Cent Tin, and a Little Antimony—Structure Fine, and Sheath Hard.

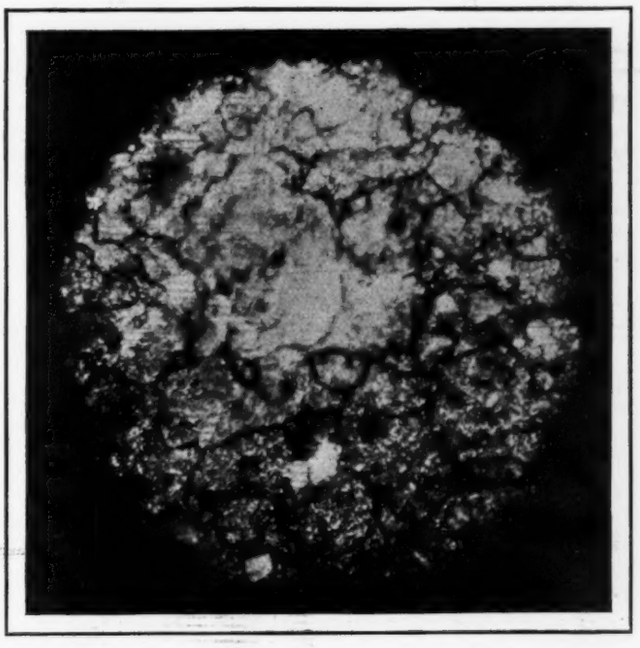
graph of a specimen taken from the armor as it was cut from the cable. This armor is from an underground cable, as it was desired to have a sample of armor of commercially pure lead free from "crystallization." No. 2 is from another sample.

A slightly different structure (not shown) is obtained by remelting a specimen to do away with any strain caused by the die in making the cables.

Sample No. 1, as shown, was of commercially pure lead. Another view, not shown, was taken from a remelted specimen from the same cable. The structure in both cases is coarse, though it was plainer to the eye than in the picture owing to the lack of color contrast.

No. 2 was of lead with a little over 3 per cent of tin. Here the crystalline structure is finer and better marked than in the lead. In another sample, photographed in the unstrained state, the structure is more perfect than in No. 2.

No. 3 contains a little 2 per cent of tin and a little antimony. The crystals here are finer than in any of the



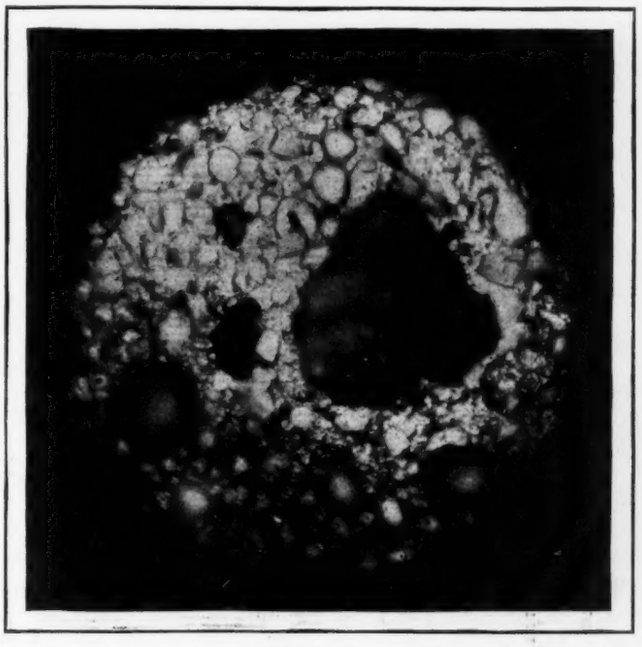
Specimen No. 4—Appearance of Badly "Crystallized" Sample of Commercially Pure Lead Sheath.

previous specimens. The metal was considerably harder than the others.

In the specimens so far mentioned no trace of "crystallization" was present.

No. 4. Commercially pure lead. Badly "crystallized." Note that the surface is crossed in all directions by deep cracks (though much too fine to be seen by the naked eye). There is, however, no sign of a tendency to break up into a definite form of crystals.

No. 5. Commercially pure lead. Badly "crystallized."



Specimen No. 5—Another Form of "Crystallization," Leaving Holes, Not Cracks, in Structure.

The surface is not seamed as in the preceeding sample, but full of minute holes. Outside of these holes, the structure is like that of the good samples.

Rods 11/23 of an inch in diameter and long enough to be clamped with 6 inches between the jaws, were cast and tests of the tensile strength, the per cent of elongation before rupture and the number of twists necessary to break off a 6-inch rod were made.

The commercially pure lead had a tensile strength of 2300 pounds per square inch. The lead-tin alloy had a tensile strength of 3700 pounds per square inch. Though "crystallization" undoubtedly occurs in the armor of cables containing tin, none of the samples examined which contained tin were found damaged in this manner. If the disintegration is caused by the alternate stretching and compression, as stated in the first part of this article as probable, that metal which can best withstand this stretching and compression, namely that which has the greatest tensile strength, will last the longest. It is not maintained that this is the only factor entering into this problem. It is, however, a very important one.

The Preservation of Poles*

By H. P. Folsom

In 1884, Mr. Boulton, an emminent engineer of England, read a paper before the Royal Society of Engineers, in which he reviewed all the known methods of treating timber antiseptically. He had an experience of over thirty years in treating poles. He showed that the brush treatment, the open and closed tank treatment, the vacuum and pressure processes with and without heat, were then in use; that creosote, sulphate of copper, zinc chloride, corrosive sublimate, and twenty-five or thirty other well known germicides, were in use or had been tried at that time; over a hundred patents had been taken out on wood preservers, and different methods of injecting chemicals into timber. Indeed all the different chemicals now in use to preserve poles, were well known then. This paper of Mr. Boulton was discussed by practical engineers from many countries, and it, together with the discussions were printed in book form. It constitutes today a classic on the antiseptic treatment of timber. Yet, at that time the real cause of the decay of timber was not known to more than a dozen in the convention. Indeed the idea that fungi were a cause of the decay was scouted by some of the greatest scientists in the world at that time. Yet, strange as it may seem, every one of the chemicals that had been used were most powerful germicides, and are today in constant use for that purpose. It is a well established fact that the cause of the decay of poles at the ground line is a fungus growth; in other words decay is the work of a germ, which feeds upon nourishment taken from the timber. Furthermore, it is known that this germ attacks the pole from the outside, and not the inside, except, of course, in cases of butt rot.

Although these various methods of impregnating timber with chemicals have been known and used with some variations for sixty years, it is estimated that less than ten per cent of the poles in use in the United States have been treated by any method.

This doubtless comes: First—from the plentifulness and cheapness of poles.

Second—From the fact that most methods require large and expensive plants, and therefore require the poles to be transported to the plant for treatment, thence to the point where they are used.

Third—Because of the difficulty of obtaining positive and uniformly good results.

Mr. Boulton's paper and the discussions thereof established that the material used to preserve poles by the method then used must have two properties.

A. It must be a germicide; and

B. It must be a germ excluder. That is, it must be of and in itself a germicide and a germ excluder.

The great effort of all experimenters and scientists from that day to this, has been to get some chemicals, or combination of chemicals that, when injected in a soluble condition, would become immediately insoluble; one that would not wash, leach or soak out, but would remain in the timber indefinitely and kill the germs therein, and prevent other germs from entering. Science has so far failed to find this substance. It is a very easy thing to obtain powerful germicides. Indeed there are many such, sulphate of copper, chloride of zinc, creosote, chloride of sodium, sulphate of iron, and many others, are all powerful and efficient germicides, and cheap enough to be used in the preservation of poles. So powerful is sulphate of copper, that one drop of a saturated solution thereof placed in a fish aquarium holding four gallons of water will destroy all the algae therein, yet leave the fish uninjured; or if you place one-half ounce of sulphate of copper in a cistern containing sixty or seventy barrels of water, it will kill all the algae therein, and render the water almost pure. Chloride of sodium, or common salt, is one of the most universal and widely used preservatives of both animal and vegetable matter known.

It is a popular motion that deep penetration of germicides is necessary to effectively preserve timber or poles. This we have found by common observation, and many experiments with the microscope, is not true. The wood destroying germs begin their ravages on the outside, and work toward the center of the pole. It follows then, that if the germs on and near the surface of the pole, at the ground line, can be destroyed, and the myriads of germs in the air and in the soil, surrounding the pole, can be excluded, the pole will be preserved. The only advantage there is in deep penetration, when using the old methods, is that it rquires a longer time for the germicides to be leached, or washed out. Mr. Boulton, in his admirable work, above referred to, says: "That the quicker germicides will soak into the pole, the quicker they will volatilize and leach or wash out."

The writer believes that the practical requirements of any successful method of preserving poles must present the following advantages:

1. It must be a method that can be used by large or small companies, having a large or small number of poles to treat.
2. It must be capable of being applied to new, or partially decayed poles in the ground.
3. It must not require a large or expensive plant.
4. It must not require highly skilled labor.
5. It must not require the transportation of poles to and from the plant.
6. It must not require more than one treatment, and must be positive and effective, and relatively inexpensive.

When we began experimenting over nine years ago, with our present method, the following facts had been established by scientists and experimenters. That poles commence to decay at or about the ground line; that the

*Abstract of a Paper Presented at the Convention of the Association of Railway Telegraph Superintendents.

cause of this decay is a fungus growth, or living germ; that when this germ is killed the decay ceases; that many chemicals will kill wood destroying germs. It was also known that germicides in solution, held in contact with wood, will be taken up into the pores of the wood by capillary attraction and tosmotic forces.

Recognizing the above facts and conditions, we began experimenting with our present method. Our aim was, not to secure a chemical that was both a germicide and a germ excluder, in and of itself, but to use one or more of the well known germicides and endeavor to exclude the germs in the air and soil mechanically. To devise a method which would accomplish these results, we found to be a very difficult problem. As most germicides which are cheap enough and powerful enough to be used in preserving poles are soluble, the mechanical device must serve three purposes.

It must exclude the germ after the pole is treated and at the same time must retain and protect the chemicals in constant contact with the pole at the ground line. It must also prevent the chemicals from being taken up and absorbed by the surrounding soil.

MODE OF PROCEDURE.

We first dig down around the pole a distance of about fourteen inches from the ground line, and, if it is an old pole, clean off any decayed wood from the surface of the pole, we then place a layer of Portland cement, mixed with sand around the pole at the bottom of the excavation. Next we place our hydrobestos jacket around the pole, one to two inches therefrom, imbedding its lower edge in the cement. The two edges of the jacket are lapped from one to two inches, and fastened with a specially prepared cement, and tacked upon a lath inside the jacket. We next fill the space between the pole and the jacket with our germicides in a dry state, mixed with sand. We then form around the top of the jacket a reenforced cap or collar made of Portland cement (one part to three or three and one-half of sand). For re-enforcing, we use one or more wires around the pole, embedded in the cement. Old telegraph or telephone wire may be used. The collar protects the chemicals and jacket from the action of the rain and snow, and if along steam railroads, protects the pole against the numerous grass fires. The chemicals are slowly dissolved by the natural moisture in the pole, and they pass into the wood by capillary attraction. As they cannot pass out into the surrounding

Pole Equipped with Germ Excluder Jacket Which Contains the Germicides.

ground they go into the pole, thus destroying all fungi and wood destroying insects. We have then a continuous absorption of chemicals and a mechanical exclusion of germs. The hydrobestos jacket is a pure mineral, composed of specially prepared and purified asbestos and asphaltum. This material is subjected to a pressure of about 27,000 pounds per square inch in its manufacture, and is a very important factor in our method. There is no animal or vegetable fibre in it, and it is practically indestructable in the situation used.

We have used all kinds of metals and materials, but hydrobestos seems to give the best results. In some special locations we form the jacket of cement. The reenforced Portland cement cap is an important part of the protective device. It prevents the rain and snow from entering the receptacle holding the germicides, and gives a stability and attractiveness to the pole.

The collar does not crack owing to the fact that there is practically no expansion and contraction of the pole at the ground line, besides it prevents grass fires along steam railroads from setting fire to the pole.

Let it be remembered that there is no secret about germcides among scientists. Our aim was to select those that were powerful and effective; that would not injure or weaken the fibre of the wood and yet were cheap enough to be practiable.

We use hydrated lime (rock), chloride of sodium, mixed with coarse sand and ¼ to 1 pound sulphate of copper per pole, according to the size and condition of the pole. Indeed we vary the above proportions somewhat in cases of partially decayed poles according to condition.

We are frequently asked as to the effect of our treatment on unseasoned poles and posts. While we do not approve of the practice of putting poles and posts in the ground while green or unseasoned, for many reasons, yet we have treated sycamore, willow, soft maple, cotton wood, Carolina poplar and red oak posts that were cut in the spring and placed in the ground, which after three years showed not the slightest sign of decay, although some of them were cracked above the ground line. Our treatment of telephone and other poles, whether seasoned or unseasoned has given uniformly good results.

TIME AND EXPENSE.

On small jobs the men work in gangs of three. One man goes ahead and digs around and cleans the poles, and the other two follow with a one-horse wagon or hand truck containing the chemicals, if the line of poles is along the road or on the streets of a city, and finish the treatment. The material may be distributed in small sacks to each pole from a hand car, if the line is along a railroad. One gang of men can treat from 20 to 30 twenty-five foot poles per day. A much larger number of new poles can be treated in a day. The cost of treating this size depends upon the accessibility of the poles, and whether the materials are purchased in carload lots or not, and the price of labor; but the cost would generally be from seventy-five cents to a dollar per pole, including royalty. We have treated some very large poles worth from $50 to $75 at a cost of $1.50 to $2.50 for treatment. Even this will pay, when we take into consideration the cost of removal and renewal of the pole. These figures may be reduced on large contracts.

According to the U. S. Forest Service experts the open tank treatment costs 67 cents per pole, not including hauling to and from the plant.

We have poles which were partially decayed when treated, and over nine years show no increase in the decay and the protecting device is in good condition. We have no hesitancy in saying from our experience that poles thus treated will have an extended life of ten or fifteen years, and we believe longer. Furthermore the pole will retain its full strength at the ground line during the greater portion of that period. That fact alone is of great advantage in sleet and wind storms.

A Magneto Board of 2,400 Line Capacity

By H. R. Dilks

The Southeastern Illinois Long Distance Telephone & Telegraph Company, of Robinson, Ill., has recently installed one of the largest multiple magneto telephone exchanges in this country. The equipment provides for an ultimate capacity of 2,400 lines, with a present installation of 1,180 lines.

The Two-Position Toll Desk.

Under ordinary circumstances a common battery system would be selected for an exchange of this size. There were, however, certain conditions at Robinson which amply justified the adoption of a magneto system, both from a financial and operating standpoint. First, a magneto system was to be replaced having many ground return lines. The adoption of a common battery system would therefore require a much more complete and expensive reconstruction of the outside equipment than would be necessary with a magneto exchange. Second, a large number of the subscribers were on country party lines. With a common battery system, either a trunking system with its accompanying delay in handling calls, or an expensive multiple system would be required to satisfactorily take care of these country lines.

Having decided on maintaining a magneto exchange the points considered in the adoption of a practical equipment were the most compact line signal and the best method of handling the party lines. As it fulfilled these conditions, the apparatus of the L. M. Ericsson Telephone Manufacturing Company, of Buffalo, N. Y., was selected. The line signals used consist of the well known indicator jack, the efficiency and compactness of which render it particularly well adapted to a multiple exchange of this size. These indicator jacks are so mounted that they require in the answering panel only the same space which would be occupied by a corresponding number of common battery answering jacks and lamps.

The non-ring-through cord circuit provided a complete solution of the problem of handling bridging party lines and harmonic party lines, being designed to effectually prevent false signals when a connection is up between two such lines, and the subscriber on the country line "clears out."

This cord circuit is equipped with a clearing-out drop and an armored clearing-out relay with two windings. One winding is of high resistance, corresponding to that of the ordinary clearing-out drop. The winding is bridged directly across the cord circuit. When a subscriber "clears out," the first impulse of the generator operates this relay closing two contacts, one of which permits battery to flow through the other winding of the relay, thus locking it in the closed position. The other contact bridges the low resistance clearing-out drop across the cord circuit, thus effectually shunting the ringing current and preventing the passing of sufficient current through the cord circuit to operate the party line bells. On the return of the plugs to their seats this local battery circuit is opened, thus releasing the relay, and at the same time restoring the clearing-out drop. This cord circuit requires no more attention on the part of the operator than the ordinary bridged drop, and on account of the extreme sensitiveness of the apparatus used, a positive clearing-out signal is assured.

The local switchboard consists of five sections, of two positions each. The first position is equipped for toll and rural service. There are 60 mechanically self-restoring drops, 20 of which are equipped with keys for switching the lines from the toll to the local board for night service. Ten cord circuits are provided, each equipped with three double cam keys—for straight ringing and listening, listening on the answering or calling cord separately, ringing back on the answering cord, and for cutting in a repeating coil. A master four-party ringing key is also used in connection with these cords.

The second position is also equipped with 60 mechanically restoring drops. In this position there are 16 standard cord circuits, each equipped with individual four-party ringing keys. The third to ninth positions inclusive are each equipped with 150 indicator jacks and 16 regular cord circuits with listening and individual four-party keys. The

The Wire Chief's Desk.

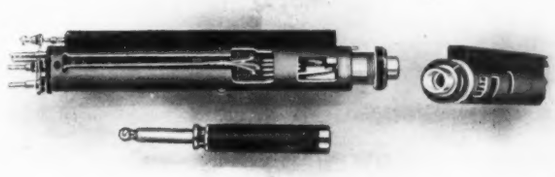
tenth position is unequipped, but the wiring is all provided so that additional lines may be added one at a time if desired. This provides a present equipment for 1,170 lines, 1,150 of which are multiplied. Each position is equipped with a breastplate transmitter and head receiver. The first

two cord circuits in each position are equipped with repeating coils and keys for cutting them into the circuit.

Immediately above the answering panels, and below the regular multiple field, is provided a space in which are mounted the multipled country lines and the multipled trunks to the toll desk. Directly below the answering panels are the supervisory and line pilot lamps. One feature of this equipment which is especially worthy of attention is the cross connecting panel or intermediate rack in the rear of each position, where any desired cross connection can be made between the multiple jacks and the indicator jacks. This intermediate rack is very compact and provides this desirable feature without occupying additional floor space, as would be required with a separate intermediate rack. Above the intermediate rack is a small terminal panel on which are the terminals for power wiring, trunks, etc., and above this are mounted the clearing out and trunking relays.

The equipment includes a two-position toll desk with a capacity of 40 lines; 10 lines and 10 cord circuits are equipped in each position. The line signals and cord equipments are the same as those used in the first position of the multiple board. Between the two answering panels a space is provided for the trunk equipment. This includes 12 toll to local trunks plug ended on the multiple board, 10 recording toll trunks multipled in each position of the local board, and trunks to chief operator and wire chief. These are all equipped with lamp signals. Six of the toll to local trunks terminate in the first position and the remainder are distributed among the different positions. Breastplate operators' sets are also used on the toll board.

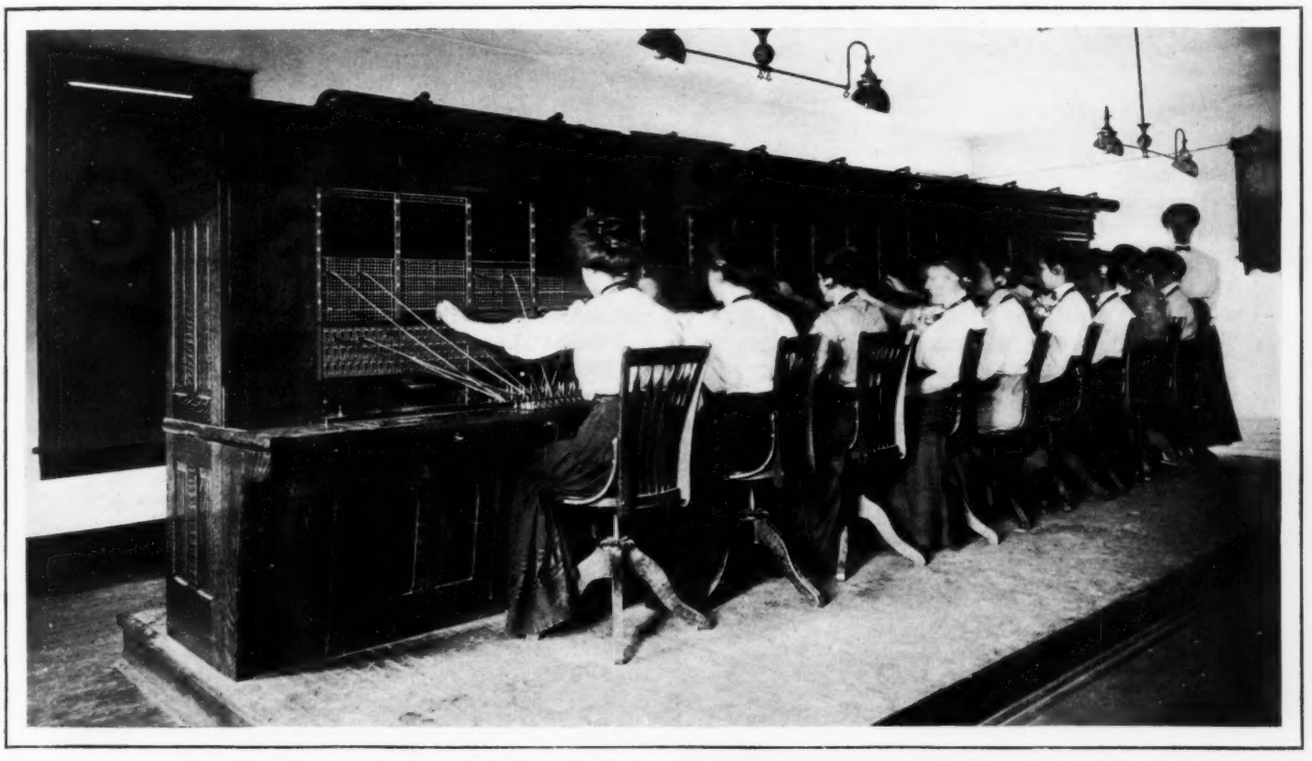
The chief operator's desk is provided with multipled and plug ended trunks to the multiple board, and trunks to the toll and wire chief's desks. There are three sets of monitor lamps for each position—clearing-out, line and listening. These are mounted at the top of the desk. Below them are the corresponding monitor keys which permit the chief operator to listen in on any operator's circuit without being observed, and by use of an additional key permit her to talk with the operator if desired. Two service observation trunks are provided, each equipped with an electrically self-restoring drop. These trunks terminate in cords and clips on the main frame. In the bed of this desk, directly in front of the chief operator, are provided three sets of card indexes. This arrangement is particularly convenient, as the duties of the operator involve both those of chief operator and information clerk, and thus all records are kept readily accessible. A duplicate monitor equipment, consisting of monitor lamps and keys, is mounted in the manager's desk.



The Indicator Jack and Plug.

The wire chief's desk is equipped with complete testing apparatus in connection with trunks to the multiple board, toll desk and main frame. This apparatus includes a model 57 Weston double scale voltmeter, which, used with a shunt, gives full scale deflections of 50, 5 and .5 volts. The main frame has a capacity of 1,600 lines and is equipped with 1,180 American "H" protectors. A Holtzer-Cabot duplicate harmonic converter furnishes ringing current for the entire exchange.

The local board, chief operator's and toll desks are located in a large room on the second floor of a building recently built by the local company. The room directly below this is used for a terminal room. Here is located a main distributing frame, wire chief's desk, power panel and harmonic converter. In the basement of the building are located the storage battery and charging set. The storage



The Multiple Magneto Switchboard of the Southeastern Illinois Long Distance Telephone & Telegraph Company at Robinson, Ill., Used for Local Service.

battery furnishes current for the clearing-out relays, operators' transmitters, pilot and trunking lamps, etc. The charging generator is driven by a direct connected two-cylinder gas engine.

Returns From Advertising Telephone Service.

Having asked the writers for information on the benefits they have been able to trace to recent advertising of service, TELEPHONY has received two valuable communications, which follow:

"I have always found it a rather hard matter to actually trace back and express in dollars and cents returns from schemes advertising telephone service. Advertising or publicity of the right kind is undoubtedly as valuable to the telephone business as to any other business, and I am a great believer in it.

"In endeavoring to bring to public notice toll line service, and educate the people to its many uses, I have found no scheme that will approach personal solicitation in value. In the end I also believe this the cheapest scheme, although it is advisable to supplement it with the usual publicity methods, and I can think of any number of instances where direct returns in dollars and cents can be shown. For instance, a large wholesale house in this city had until eight months ago never used our long-distance lines to any considerable extent. After a little personal solicitation, and a few trial calls, its toll bill has ever since averaged more than $50 per month, and went as high as $125 during one month. As another instance, we formerly had in the Lincoln Hotel, in this city, an old rusty looking booth in a dark corner. The monthly receipts from this booth averaged about $40 per month. We put in two finely finished booths, which showed up to much better advantage, and the receipts immediately went to over $100 per month and have never since fallen short of this figure.

Frank H. Woods
President

Lincoln, Nebraska,

Dear Mr. Johnson

Perhaps you are not aware that the Independent Telephone Companies are giving a superior grade of Long Distance service between the principal cities and towns in this and neighboring States.

I want to impress you with this fact and extend a personal invitation to use our Long Distance Lines to your home or office at Omaha. The rate is 35¢ for 3 minutes conversation, and after 6 p. m. it is only 25¢.

We have a Long Distance Telephone and Booth on the main floor of this Hotel, or you can call "Long Distance" from any Automatic Telephone. Our sign is the Red, White and Blue Shield. It will be worth your while to look for it whenever you wish to use a Long Distance Telephone.

Yours very truly,
Frank H. Woods
President.

Form Letter Delivered to Hotel Guests by the Lincoln Telephone & Telegraph Company.

"As another instance, we recently made an exhibit at the "Made in Lincoln Exposition" in this city. Among other things we made an exhibit of an intercommunicating system, and as a direct result secured an order for an intercommunicating system which will show a good profit on the cost of the exhibit.

"I think we have obtained good results from the use of a form letter which is delivered by messenger to new arrivals in the city. Their names are secured from the hotel registers and shortly afterward they receive a letter, herewith reproduced, in an envelope bearing on the lapel the Independent "Shield," and with the "Shield" prominently displayed at the head of the letter. The novelty of the plan and the quality of the stationery employed undoubtedly have something to do with its success.

"I have given you instances derived from recent experiences and can recite similar cases which I have noticed in various places."

Lincoln, Neb. George K. Gann,
Traffic Manager, Lincoln Tel. & Tel. Co.

The second letter reads as follows:

"I am unable to give figures of increase in our long-distance or local business, resulting directly from any particular line of advertising. But, taking it as a whole, I submit the percentage of increase by months of our long-distance business, without the expenditure of any money for additional lines or equipment.

August	22 per cent increase
September	81 per cent increase
October	70 per cent increase
November	5 per cent increase
December	3½ per cent increase
January	9 per cent increase
February	2 per cent increase
March	11 per cent increase
April	10 per cent increase

"Each percentage is figured on the increase of the business over the previous month. We have been compelled to confine ourselves to circular letters, postal cards, moving picture shows, and the daily papers on account of not having any street cars, bill boards, or other mediums such as are offered in cities.

"I am a great believer in public booths and pay stations, and the following conditions will show results gained: When we had but one booth in town our booth business amounted to less than $10 a month. Today we have four booths installed, and we are doing $40 a month business so you see that a booth which costs, installed complete, between $50 and $60 brings a revenue of $120.00 per year, which otherwise we would not receive at all. The maintenance and upkeep is less than for the average telephone, while the collections are prompt and undisputed."

Norfolk, Neb. W. J. Stadelman,
Gen. Mgr., Norfolk Long Distance Tel. Co.

Michigan Rural Telephone Managers Give Up Demand for Free Service.

An effort was recently made by the rural telephone systems in Barry county, Mich., to get free service between the different exchanges in the county. On June 19 representatives of these companies met with general manager C. E. Tarte of the Citizens Telephone Company, at Hastings, where the Citizens company owns an exchange. Mr. Tarte showed the disadvantages from a business standpoint of giving free interchange, and the farmers left satisfied with the present arrangements. They will, undoubtedly, be more satisfied as time goes on, as experience in other parts of the country has shown that too extended free service will lead to eventual failure of farmers' companies involved.

The Modern Telephone Cable*

By Frank B. Jewett

To those not closely in touch with the telephone situation to-day, the importance of the modern telephone cable may be indicated by stating that of the 80,000,000 miles of wire in the exchange plants of the Associated Bell telephone companies, more than 6,800,000 miles are in the form of underground, aerial, or submarine cable. These figures refer solely to the wire used for outside construction and do not include the thousands of miles of wire in cable form employed in central offices or the wiring of large buildings.

At the present time the bulk of the cable in any telephone plant is used in connection with exchange construction in urban districts. For a large part of such work the concentration of hundreds of circuits in the form of cables is the only available method of providing the facilities necessary to meet present-day service demands, which in many of the larger cities exceed one telephone for each 20 inhabitants, and in a few cities more than one for each 10 inhabitants.

It should be clearly recognized, however, that even the best cable circuit is much less efficient than an open-wire circuit; for example, one mile of the No. 19 B. & S. gauge cable circuit ordinarily employed in exchange construction results in as much current attenuation as 35 miles of No. 8 B. W. G. open-wire copper toll circuit, or 3.5 miles of the smallest size open-wire iron circuit used in rural exchange work. From these figures it is apparent that the extensive use of cable necessarily results in a material reduction of the radius within which satisfactory commercial transmission can be given, and as the most advanced telephone art to-day is only with difficulty meeting the increasing demands for long-distance service, cables can be substituted for open wires only when the further maintenance of open-wire circuits becomes impracticable. It is on account of this decrease in efficiency that the telephone company expends such large sums to retain open-wire circuits for its toll lines as close as possible to the central office, but even in this portion of the plant increasing numbers of circuits have forced the abandonment of pole lines in certain situations.

In another direction also the necessity for cable construction has developed to a certain extent; namely, providing the necessary circuit facilities between very large cities separated by moderate distances and between which there is a great deal of terminating telephone business; thus at the present time the business between New York and Philadelphia, New York and New Haven, and Chicago and Milwaukee, is handled over all-cable circuits.

The extensive application of cable construction in the modern telephone plant just outlined has been made possible only through the development of a form of cable exceedingly efficient as compared with the earlier forms. It is the purpose of this paper to consider a few of the essential requirements which have had to be met in the production of such a cable. While certain features of the manufacturing processes are described in order to explain the method of obtaining certain characteristics, the paper is in no sense an exposition of the technique of cable manufacture. In order to show how the telephone engineer ensures the production of a cable having the desired characteristics, clauses covering the points discussed have been taken from the standard form of cable specifications employed by the Associated Bell companies.

THE ESSENTIAL REQUIREMENTS OF THE MODERN TELEPHONE CABLE.

The essential requirements for an efficient and satisfactory telephone cable, while primarily electrical, are of course unavoidably connected with mechanical and cost restrictions. These requirements, which must be fulfilled by the cable and which form the basis of present-day cable specifications, are briefly as follows:

1. That the cable shall provide the maximum number of independent and non-interfering circuits within the minimum space.

2. That these circuits shall have the maximum transmission efficiency for currents of telephonic frequency, compatible with the other electrical and mechanical requirements.

3. That the dielectric strength of the cable shall be such as to ensure against failure from any of the potentials normally employed and to make possible its protection against damage from lightning and from foreign circuits operating at potentials in excess of those employed on telephone lines.

4. That the mechanical arrangement adopted to obtain the necessary electrical properties shall be such as to insure a continued maintenance of these properties after the cable has been installed. This assumes a construction which will withstand the hard usage unavoidably connected with cable installation.

5. That this mechanical construction shall be made at a cost which will render the cable circuits economically available in comparison with other known means of circuit provision.

In addition to the foregoing, certain subsidiary requirements dealing with the general size of the cable desired; that is, the size of wire and number of pairs required; the method of circuit identification (color scheme); the length of cable sections to be furnished; the method of preparation for shipment and some form of guarantee which will insure high-grade material and workmanship in the manufacture of the cable, are ordinarily covered in the cable specification.

Standard cable construction. While differing somewhat in details, the essential features of all modern telephone cables, known as dry-core paper-insulated, are the same whether the wires are in the little five-pair or ten-pair subscribers' cables ordinarily strung on pole lines or in the largest sizes employed underground. Cables of this type are in one respect fundamentally different from cables which employ rubber or gutta-percha insulation. In the latter construction the dielectric which surrounds the wire serves not only to keep the wires in proper position, but being itself impervious to moisture, the dielectric serves to maintain the efficiency of the circuit, whether exposed to moisture or not. The telephone cable, on the other hand, belongs to that class of cables in which any solid dielectric employed is used primarily as a mechanical separator or to give the requisite dielectric strength. In this class of cables the deleterious effects of moisture are guarded against by surrounding the conductors with a water-tight metallic sheath.

For making up telephone cables, wires of the proper size are first insulated by wrapping them individually with dry paper ribbon. This ribbon, which is usually about 5/8 in. wide and of a thickness varying from 0.002 in. upward depending on the size of the wire, and colored in some distinctive fashion, is spirally applied, but not with such a tension as to cause it to adhere closely to the wire. For the ordinary underground or aerial cable a single wrapping of paper suffices; in some forms of submarine cable two wrappings of paper, laid on in reversed directions, are used. In any event, the ribbon is overlapped, sufficiently so that the wire is completely covered. Thus insulated, the wires are twisted together in pairs, the two wires of a pair being insulated with different colored papers and the length of twist depending upon the size of the conductors and

*A paper presented at the twenty-sixth annual convention of the American Institute of Electrical Engineers, Frontenac, N. Y., July 1, 1909.

the use to which the cable is to be put. The maximum length of twist, however, rarely exceeds 6 in. and for the smaller sized wires is ordinarily under 4 in. This twisting of the individual circuits is for the purpose of neutralizing inductive and capacity effects, which would occasion "cross-talk" between the various circuits if the wires of the core were laid up parallel to one another.

The core of the cables is made up in cylindrical form by assembling the requisite number of twisted pairs together in concentric layers one or more pairs thick, the pairs in each layer being arranged spirally about the axis of the core and the direction of rotation in the alternate layers being reversed. As explained below this use of a concentric layer construction is adopted to ensure the necessary mechanical stability for the completed cable. The number of pairs in each layer is dependent upon the size and capacity of the cable required and is varied by changing the size of the central strand.

When the cylindrical core has been completed, it is wrapped with one or more thicknesses of paper tape to bind the conductors firmly in place, present a smooth exterior surface, and prevent the lead of the sheath from coming in contact with the insulation of the outer layer of conductors. This wrapping also gives the higher dielectric strength needed in the pairs of the outer layer. During the process up to this point the paper, being hygroscopic, has unavoidably taken on more or less moisture which must be removed before the sheath is applied. To this end the core, suitably reeled, is placed in a drying oven in which air at a high temperature is circulated for a considerable period, after which the core is taken immediately to the lead press and the final sheath applied. This completes the process except for the testing, sealing of the ends and reeling for shipment.

While the individual wires forming the core of the cable just described are wrapped with paper, the cable is essentially different from the ordinary paper-insulated power cable, in that it is in effect an air-core construction. The paper, which is loosely applied and fills only a part of the total space not occupied by the conductors, is deformed in the process of cabling and serves merely as a mechanical separator to keep the wires apart and not as a dielectric *per se*, or as the carrier for a dielectric compound. In cable of this types the real dielectric is the dry air between the wires.

To show how nearly the present dry-core cable meets the essential requirements of the telephone industry, it may be interesting to examine some of these requirements and their actual fulfilment in detail and also the evolutionary process by which the present form of construction has been arrived at.

Choice of the dielectric.

Specification requirement: Each conductor shall be insulated with a single wrap of paper spirally applied.

In designing a cable for high-frequency current transmission work the principal requirement, as previously noted, is that it shall combine the maximum number of independent non-interfering circuits having a maximum of transmission efficiency within the minimum space and at a minimum cost. It is essential, therefore, that the dielectric selected for maintaining the proper separation of the wires and providing the necessary mechanical properties required of the cable should have both a low dielectric capacity and small dielectric hysteresis. These features, which in power cables designed for transmitting large amounts of low-frequency, high-potential current may be of secondary importance compared with high insulation and high dielectric strength, become paramount when the question is one of securing an efficient cable for the transmission of small currents having frequencies ranging up into the thousands of periods per second, and in which high dielectric strength is a matter of secondary consideration. The importance of these characteristics of the dielectric are readily apparent when we come to examine the mathematical expressions for the propagation of high-frequency currents, met with in telephony.

For a uniform metallic circuit containing resistance, inductance, capacity and leakage uniformly distributed, the formula for the attenuation constant is

$$a = \sqrt{\tfrac{1}{2}\sqrt{(R^2+L^2\omega^2)\ (S^2+C^2\omega^2)}\ +\ \tfrac{1}{2}(RS-LC\omega^2)}$$

In this formula R, L, and C have the ordinary significance, being respectively the resistance, inductance, and shunt capacity expressed in ohms, henrys and farads, while ω has the ordinary significance, being 2π times the frequency, and S, which represents the shunt leakage in parallel with the shunt capacity, expresed in mhos, is a measure of the combined direct-current conductance as determined from the insulation of the cable and also of the apparent conductance which results from the energy loss due to dielectric hysteresis.

For telephone cables where the wires are close together the inductance is negligibly small and the formula reduces to

$$a = \sqrt{\frac{R}{2}\left(\sqrt{S^2+C^2\omega^2}+S\right)}$$

or when the leakage component is small in comparison with the capacity component, to approximately

$$a = \sqrt{\frac{R\,C\,\omega}{2}\left(1+\frac{S}{2\,C\,\omega}\right)}$$

This is the formula which ordinarily applies to cable circuits employed for telephonic transmission, and it will be noted that where S is zero; that is, for cables having high insulation and no dielectric dissipation, the expression for the attenuation constant is merely that of the so-called "$K\ R$ law." The quantity $\frac{S}{2C}$ in the above formula, known as the "damping constant," is dependent on the dielectric of the cable and is independent of the capacity of the cable, provided the dielectric is unchanged in character by changing the separation of the wires. In order, therefore, that the transmission efficiency of any cable shall be high for some particular frequency or range of frequencies, it is necessary that in addition to low capacity, the dielectric shall have the smallest possible ratio of shunt conductance to shunt capacity for these frequencies.

In the following table are given the constants at one thousand periods per second for No. 19 B. & S. gauge cables made up with rubber insulation, braided-cotton insulation impregnated with paraffin, and dry-core paper insulation. In each case the cables have the constants normal to the particular kind of construction. From this table it will be noted that for rubber-insulated and cotton-impregnated-insulated cables both the capacity and conductance are materially higher than in the dry-core, paper-insulated cable.

CONSTANTS OF NO. 19 B. & S. GAUGE TELEPHONE CABLES

Insulation.	Mutual capacity mf. per mile 1,000 p.p.s.	Mutual conductance m.mhos p. m. 1,000 p.p.s.	Damping constant $S/2C$ 1,000 p.p.s.
Rubber	0.15	40	133
Braided cotton filled with paraffine	0.12	16	67
Dry-core paper	0.08	2	12.5

Taking the constants of the foregoing table and applying them in the approximate formula, it will be seen that the attenuation constant of the impregnated cable is 24 per cent, and that of the rubber 40 per cent, higher than that of the dry-core paper cable; also that while the dissipation of the dielectric increases the attenuation in the latter cable by less than 0.2 per cent at 1,000 periods per second, that in the impregnated cable increases it by 1.05 per cent and in the rubber-insulated cable by 2.10 per cent. In addition to the effect of dielectric dissipation increasing the attenuation of the cable, the fact that this increase is not constant for all frequencies, but it is greater the higher the frequency, results in a cable with high dielectric dissipation having more distortion than one in which the dissipation is low over the range of frequencies involved in speech transmission.

From the above table it is also evident from the small value of the dissipation constant for the dry-core cable that with this type of construction conditions have been attained approximating very close to those in which nothing but air would intervene between the wires. In addition to the numerous mechanical, electrical, and economic defects which obtained in impregnated and rubber-cored cables, the fact that they were materially inferior in efficiency to the present type of dry-core construction was one of the principal factors leading to the adoption of the latter.

(To be concluded.)

Collecting and Its Success at One Exchange.

Mr. S. D. Thompson, of Cameron, Mo., in his paper on this subject presented at the Missouri convention, said:

"From the viewpoint of 'getting the money' our plan is a success; from the point of avoiding trouble, it has nothing especial to commend it. In the very nature of things to get money from a man for anything that he does not eat or wear will cause some trouble and inconvenience, and it resolves itself into the question of what kind of trouble or inconvenince you prefer. We have chosen a way that gets the money and must put up with whatever follows in its wake.

"From the start our rents were due and payable on the 15th of the current month. In the first stage the exchange belonged to two partners, one of whom attended to the collecting, which was done on sight. The collector carried the receipts in his pocket and made collections haphazard wherever and whenever he could flag a subscriber. By the exercise of eternal vigilance and the alertness of a political candidate before election, about 75 per cent of the bills were collected during the month, the balance becoming chronic delinquents.

"In the second stage a young man was employed to shoot trouble, help at the switchboard, work on the line and incidentally do the collecting. He called at both business houses and residences, making the rounds in a day and collecting about 50 per cent of the bills. In a few days he would call again and get possibly 25 per cent of the balance. He kept rounding them up and would get possibly 80 per cent collected during the month. The chronic delinquents, freed from meeting the proprietor himself, got in deeper and deeper; some running from three to ten months behind. Repeated calls, the growth of the exchange and the necessity of keeping after delinquents gradually absorbed more and more of the employee's time until instead of incidentally doing the collecting, it was accidental if he got to do much of anything else.

"In the third stage the collections were taken over by the secretary, who had an office down on the street. More stringent measures having become necessary, the following plan was adopted after very mature deliberation and due notice having been given. A collector was sent out on the 15th and called on every subscriber once and once only. If the collection was not made, or the party not found, a printed notice was left stating that the collector had called for the rent and not obtained it, and that payment must be made at the office of the secretary not later than the 25th or the service would be suspended. This rule was rigidly and impartially enforced, so impartially in fact, that one of the officers of the company was caught in the dragnet the first month. Although every precaution had been taken to prevent it, and 'break them in easy,' several telephones were 'spiked' the first month, which was done by putting a wooden plug in the jack; this is now done by inserting a toothpick under the spring in the terminal rack. No general explosion resulted though there were isolated brimstone blazes and sulphurous sputterings. The second month was worse than the first and twice as many telephones were cut out. The temperature rose rapidly and the fur began to fly, but we had anticipated this and were not stampeded. Having carefully considered the matter and mapped out our course we said little and sawed wood.

"All the kickers were, however, treated with uniform courtesy and we steadfastly refrained from heated arguments, constantly reminding them that it was merely a business proposition with us, utterly devoid of any sentiment. The third month was, if anything, still worse and the pot was boiling in earnest. The next few months were repetitions in a degree but gradually getting better. An attempt was made by some soreheads who had gone to sleep on pay day to stampede our patrons to the rival exchange that knew better how to treat white people than that blankety blankety blank bunch of cutthroats, etc., etc.

"We had figured that there would be more or less sheet lightning and thunder, but not much execution, and that to 'sass back' would only add fuel to the flames, so we gave them all the rope they needed and never let on that we noticed anything out of the ordinary and said very little in our own defense.

"Breaking bronchos is not done in a padded stall nor with shoe string equipment, but the insurgents are hitched to a heavy wagon with substantial harness and, instead of trying to prevent it, if they want to indulge in ground gymnastics or aerial antics they are allowed to do so, and when they get tired of it are brought down to business. That was about the way we figured this matter; we supposed there would be more or less plunging and cavorting, but what could they do in the end but submit? We had tried every way we could to please our patrons and accommodate them in the manner of collecting and it seemed like the more we tried to please the more trouble we had. It gradually dawned on us that probably we were working on the wrong plan and should consult our own convenience instead. We recalled the motto of a Cameron railroad conductor, 'Get yours' and the more we thought about it, the more stupid we seemed in not exercising the power we realized we had. If there is a business on earth that can dictate terms in a case of this kind it would seem to be the telephone business, if they have the nerve to do it.

"Even though they have competition they can dictate any reasonable thing they please and say, 'Do it or no service' and what can the subscriber do to help himself? He grows hot under the collar but—wears the collar. He may fume and storm and sputter, but it won't make his telephone work. Money talks and he soon realizes that nothing but his dollar will convert the Sphinx on his wall and he accepts the inevitable.

"We figured this would be the case; we tried it and found that it was, for in a few months the vocabulary of invectives was exhausted and the smoke cleared away with Casey at the bat. The attempted stampede did not occur; in fact the Filipinos all straggled back sooner or later, each paying $1.00 installation fee.

"In the fourth stage we concluded another improvement could be made and, again recalling the motto 'Get yours,' we went after it. Our plan was not perfection, as we were still in a degree trying to please everybody, but everybody did not seem to appreciate it. Sending a collector is a nuisance, and seemed to become more of a burden all the time. If we enforced our rule to call but once, many who were easy to collect from would be 'out' if they were not in when we called. If we enforced the rule as to some and not all, we had no rule, but it was a very strong temptation to make a second call on a good

natured subscriber who was not seen on the first call. We tried to figure out some way to collect with less trouble, and it occurred to us, 'Why send a collector to the patrons at all?' Why not have the patrons come to the collector?

"Counting the cost and estimating the consequences we concluded to try it. We did and found it worked out very satisfactorily—to us. The subscribers grumbled of course, but they got in line. They were notified that the rent must be paid at the office and was due on the 15th; if not paid by the 5th of the next month the service would be suspended.

"We think we made a mistake in extending the days of grace from the 25th to the 5th of the next month, but have not troubled to change it. Since we adopted the rule to suspend service to delinquents, about 3 to 5 per cent of the subscribers each month are shut off. The proportion was about the same when we sent a collector as when payments were made at the office. Suspended delinquents are all cleaned up in about five days after pay-day closes, so that in five days from the close of our pay-day we have all our money. We occasionally lose a subscriber, of course, but we think we lose less than we would if we were more lenient. We have some friction but much cash with it. You think hard of your delinquents and your money is in their pockets; our delinquents may think hard of us but their money is in our pockets."

"We have met the enemy and they are ours. You can do the same if you will. But don't try it unless you mean business and have the mucilage to stick to it. You can't get the money and keep everybody in a good humor; you can't keep everybody in a good humor and get the money.

"We charge an installation fee of $1.00 and 25 to 75 cents for moves. Our policy is to charge for everything and compel payment but to give good value for every charge. If a subscriber quits without paying his last month's rent, the installation fee he paid helps out on our hurt feelings; and we find the installation fees no insignificant source of profit; in our exchange they will pay for at least one operator.

"Good service is what the subscriber really wants and if he gets it he is willing to pay for it and in any reasonable manner. We have always aimed to give good service first, then ask for what we want, and we believe our success is largely due to a careful adherence to this principle. While our ways have been condemned by some subscribers they have been commended by many others and, taken all in all, we believe we have as well satisfied a lot of subscribers as can be found in any exchange and we always try to get ours."

Telephone Used by President to Get Out Wright Brothers' Medals On Time.

The Cincinnati *Star* prints the following interesting item:

There was an account telegraphed from Washington the other day about a conversation over the telephone between the President and the director of the mint in Philadelphia that is interesting because it is so peculiarly American and so essentially democratic.

According to the correspondent, Congressman Cox of Dayton called at the White House to see if something could not be done to get the medals ready for the Wright Brothers before the date set for their presentation.

"Can't get them ready, eh?" said Mr. Taft, grimly, as he reached for the telephone. "We will see about that."

A few minutes after the President had asked the long-distance operator to connect him with Supt. Landis in Philadelphia the bell tinkled.

According to report, the conversation on this end of the wire ran something like this: "Hello! hello! Is this Mr. Landis? How do you do? This is Mr. Taft. Why are not the Wright medals to be ready for the celebration at Dayton, O.?

"What's that? Eh, w-h-a-t? I think I'm entitled to know. I'm rather interested. Oh, yes, I'm frequently guilty of taking an interest in the affairs of the mint. No, I don't think it is unusual. You see, Representative Cox had just reported to me at the White House—

"Why, yes, this is President Taft. You didn't know it? Now, tut, tut, don't apologize. That's all right. You'll have them ready? On time, sure? Fine. Good-by."

One Way to Advertise Independent Service.

Under the heading "A Telephone Window" the Butte, Montana, *News* recently printed the following:

"The Montana Drug Company is not selling telephones, but one would think it did to look at the window they have had all week. There are a dozen Independent telephones in the window, all connected by ribbons with a giant cross tree in the rear. A section of telephone pole has been set in and, though it has only one bar, it contains the complete equipment of the ordinary pole.

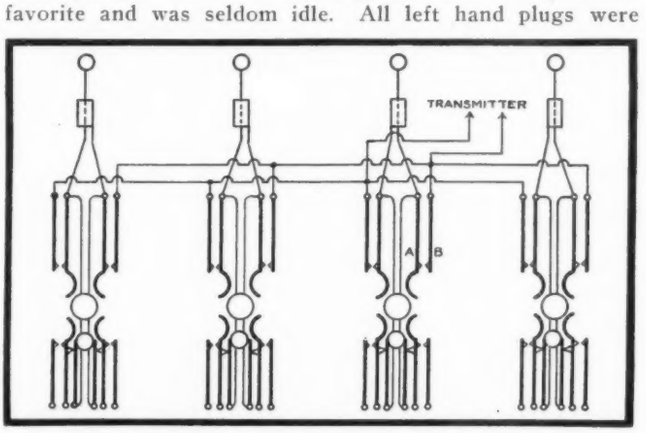
"The idea meant to be conveyed to the public is that the company pays especial attention to its telephone business, and that prescriptions will be called for and delivered if those who hold them will telephone in."

LETTERS ON PRACTICAL SUBJECTS

Complicated Result of Key Spring Trouble.

A short time ago I was called to a switchboard to adjust a so-called plug difficulty that appeared to be, on first sight, annoying and rather serious. The operator said all the plugs on the left of the center of the board were "dead," except that she could ring with them as usual, and could talk, but only by pulling them out half way. On investigation I found that the transmitter was wired to the first key at the right of the center of the board, and that spring *B* was bent and made a constant contact with *A*. This grounded one side of the transmitter when that plug was inserted.

This would also cause any plug at the left to ground a line if the operator listened in, as the tips of the plugs on the right connect to the right hand springs of the keys, and the tips of the plugs on the left are wired to the left hand springs. This third cord happened to be the operator's favorite and was seldom idle. All left hand plugs were



Keyboard Circuit and Location of Trouble in Key.

dead to the operator with this plug inserted. They were also dead to the subscribers when the operator listened in, and the third plug was inserted. They would work normally only by pulling them out until the tips made contact with the front spring, or with the third plug idle.

Arbela, Mo. A. J. Robinson.

The Telephone in the Courts

By A. H. McMillan

Tree Trimming.

I have had some inquiries recently for court decisions on tree trimming. The only Supreme Court decision that I see in this state is Nicholas Myer vs. Standard Telephone Company. Some one advised me that there has been a very favorable court decision recently wherein a person was permitted to trim a distance of two feet from all wires. Do you know anything about this decision, or have you any copies of either?

We do not know anything about the decision you speak of, neither have we a copy of the case of Myer vs. Standard Telephone Company. A copy of that case, which is reported in the 98th Volume of the Northwestern Reporter at page 300, can be obtained from the West Publishing Company of St. Paul, Minn., for about 25 cents.

Some favorable decisions on the subject of tree trimming are Southern Bell Telephone & Telegraph Company vs. Constantine, 69 Fed., 61; Hobbs vs. Long Distance Telephone & Telegraph Company, 41 So., 1003; Wyant vs. Central Telephone Company, 123 Mich., 51. In the latter case, it was held that a telephone company, authorized to erect its line along a country highway, has the right to cut away obstructing branches of trees to admit of the free passage of the wires, without first giving the abutting proprietor an opportunity to do so, but it will be answerable to him for any unnecessary, improper or excessive cutting.

Change Poles Under Franchise.

I have been a reader of your paper since I have been in the telephone business and think I can hardly get along without it.

I have some points of law I would like to ask, concerning franchise. This is a 20-year franchise, has been in force about five years. I bought the plant two years ago and it had some oak poles set on two leads from the city limits up to main part of town, then on cedar poles. The franchise calls for cedar poles in the city limits. Does this null the franchise? Can the council compel me to replace them with cedar, and can I hold my predecessor for damage who gave me a warranty deed?

The franchise is not annulled by the circumstances you mention. The council can require you to replace the oak poles with cedar in accordance with its terms. You would have no claim against your predecessor because a warranty deed protects the grantee only against defects in title. The change in poles required by the council is not any defect in title that would entitle you to hold your predecessor for damages.

Crossing Railroad at Private Crossing.

We have constructed a line over the right of way of a railroad in Illinois at a private crossing to a farm house that is just across the right of way of the railroad from the public highway. The railroad company now presents to us a contract to sign which says that we must pay them an annual rental of $5 per year. We refused to sign same unless they take out this clause, which they refuse to do, so they say they will cut our lines. No poles are in the right of way.

Under the decisions, a telephone line is an additional burden upon a railroad right of way, and when the right of way is crossed by a telephone company at a point other than a public crossing, the company is entitled to compensation therefor. Atlantic Telephone Company vs. Chicago R. R. Company, 6 Biss. (U. S.) 158; McMillan on Telephone Law, Sec. 99. The company can therefore insist upon the $5 rental clause if it so desires.

License Fee to Pay for Inspection, Justifiable.

After three years of litigation over the right to impose a license fee on the Delaware and Atlantic Telegraph and Telephone Company, the contentions of the borough of Sharon Hill have been sustained and a decree has been made by the Supreme Court of Pennsylvania covering the case. The decree is a specific one and will not affect similar situations in the other boroughs or municipalities or act as a precedent. The litigation was carried to the Supreme Court by the company.

The court stated that the borough was justified in requiring the inspection directed by the ordinance, and that the only question for determination was the amount of license fee imposed. The lower court sustained the borough ordinance on the presumption that it was reasonable without reference to whether it was based upon the cost of inspection or not. In this the Supreme Court found error, and held that it was the duty of the lower court to determine the questions involved upon the weight of evidence. To be reported in Atlantic Reporter.

Unloading Telephone Poles from Wagon.

A telephone company requiring its employes to unload telephone poles from a wagon is bound to use due care and furnish a reasonably adequate number of men to handle the poles with safety to them. A workman brought suit against the Iowa Telephone Company for damages sustained in being hurt while unloading poles, and this was the decision of the court. The load consisted of two poles measuring from 60 to 65 feet in length, and each weighing about a ton. The number of men employed did not exceed five or six, according to the finding of the jury, although the company offered testimony tending to show that eight or nine men were employed. A judgment for the telephone company was reversed by the Supreme Court of Iowa, because the trial court did not properly submit the case to the jury. Fitter vs. Iowa Telephone Company, 121 N. W., 48.

Liability of a Company for Its Agent's Fraud.

A judgment was given against the American Telegraph and Telephone Company in Spartanburg County, South Carolina, for fraud alleged to be committed by its agent in obtaining a telephone right of way. The misrepresentation that the agent was said to have made was that the company had the right to go upon the land anyway. The plaintiff was a woman who could not read.

In deciding the case, the court held that a principal is liable in punitive damages for the fraud of his agent without a showing of the principal's knowledge or notice of the fraud, or of opportunity to repudiate it, a principal being responsible for his agent's fraudulent act, where it is done in the course of his employment, although performed contrary to the principal's express directions. Brown vs. American Telephone and Telegraph Company, 63 S. E., 744.

Duty of Using Lightning Arresters.

At Troupe, Texas, a Mrs. Evans received a severe shock from a flash of lightning and brought suit against the Southern Telegraph and Telephone Company for negligence in not having installed a suitable lightning arrester. At the time of the accident, she was standing within four or five feet of the instrument. Rain was falling, accompanied by thunder and lightning. Suddenly a bright flash of lightning appeared which illuminated the room like a ball of fire, and was immediately followed by a loud report like the discharge of a gun. When the members of Mrs. Evans' family rushed into the room, they found her lying unconscious upon the floor, burned on the left side of the neck and face. An effort was made to call a doctor over

the telephone, but no connections could be obtained at the central office. A judgment for the plaintiff was affirmed by the Court of Civil Appeals. The court held that the company was bound to exercise due care in selecting, placing and maintaining in connection with its wires and instruments, such known and approved appliances as were reasonably necessary to guard against accidents that might fairly be expected to occur from lightning when conducted to and into a house over its telephone wires.

Evidence that the operator at the switchboard, about twenty minutes after the accident, stated that the telephone was torn up by lightning, was held to be admissible as a statement of fact. Southern Telegraph and Telephone Company vs. Evans, 116 S. W., 418.

The Risk of Setting a Telephone Pole and Guy Wires.

A man was injured while engaged in setting telephone poles at Leicester, Mass. No guy ropes were used, although they were at hand. The work was done under the direction of a man spoken of as "boss." A judgment against the telephone company was sustained by the Supreme Court of Massachusetts, which held that the question of whether the employe voluntarily assumed the risk of setting the pole without the use of guys was for the jury. That the employe who had charge of the setting of the telephone poles was spoken of as "boss" was held admissible as showing him to be the company's superintendent. Barrett vs. New England Telephone & Telegraph Company, 87 N. E., 565.

Practical Questions and Answers

Grounding the Mate in Cable.

A telephone man of considerable experience tells me that where it is desirable to run a number of grounded lines through several hundred feet of cable to a metallic wired switchboard, cross-talk will be almost entirely prevented if each cable pair is connected to the switchboard as in regular metallic circuit practice, and one wire of the pair connected to line and its mate to ground at the outside terminal; no repeating coils being used in the cord circuits or anywhere else. Please tell me whether grounding the mate would diminish or increase the cross-talk, and explain why.

The chief advantage in using the plan above described is that it gets the line wires farther apart than if both wires of a pair are used for line wires of different lines. It will be noticed by those using "split pairs" on grounded circuits, that most of the cross-talk comes between those two lines which are on the same pair. They are twisted together closely all the way, and of course have the very best condition for inductive action on each other. Fig. 1 shows diagrammatically the conditions when the mate is grounded. As long as a line is not connected to another line, if talking is going on, the part of the current which goes through the drop at central will return by the mate to ground. If the drop is low resistance, series, there may be enough current to have some influence in neutralizing the effect of the current in the line. If talking is done on the line alone, it will be a party line, and the drop most likely bridged, in which case it has high impedance and very little current will get through. Hence, the grounding of the mate will do little good. When two lines are connected through the board, as 1 and 4 or 2 and 5, the condition is changed. The high resistance and inductance of the clearing out drop,

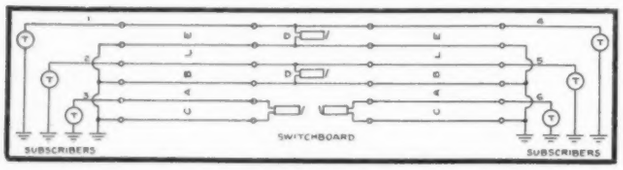


Fig. 1.

D practically cuts the mates of the two connected lines off from the line wires. It will be noticed that all the mates are practically short-circuited at the ground connection. Hence, the currents flowing in the line wires will induce currents in those mates to which they are closest. For instance, the current flowing in the line from 1 to 4 will induce a current in the line from 2 to 5, making cross-talk. But at the same time line 1-4 is inducing a current in its mate wires. This current in the mate wires will be of such a phase as to tend to oppose the cross-talk current in line 2-5. This is on the assumption that the persons are talking loudly so that the effects of magnetic induction are relatively strong.

Use of Direct Current Generators in Telephones.

In a magneto exchange, why not use on all telephones D. C. generators and A. C. bells and at central use an A. C. generator? Would not that prevent ringing the other subscribers when one rings before the disconnection?

Cost of the D. C. hand generators is one of the objections to the above plan. Also, many managers desire to let the subscribers ring each other under some conditions, which they could not do if D. C. generators were used.

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

Expansion of Metals by Heat.

I am somewhat interested in the effect of heat on different substances. For instance, I find by riveting two pieces of brass and rubber together the entire piece will bend on account of the different degrees of expansion by heat of the two substances. What I wish to ask is this: do you know of any other substances more widely separated as regards expansion on account of heat? Perhaps you know where this is put to practical use?

The best pair of substances to use for the above purpose is hard rubber and iron or steel. Hard rubber expands about .00004278 of its length per degree Fahrenheit. Wrought iron expands about .0000065, cast iron about .0000056, steel about .0000069 if tempered, or .0000064 if cast. If the two substances can be used in some way so that one of them will not need to bend, porcelain is better than iron or steel for the less expansive part, since it expands only .000002 of its length per degree Fahrenheit.

This combination of rubber and steel is used in thermostats for regulating the temperature of rooms. When the room is too warm, the compound bar bends one way, closing a circuit which starts a motor (spring or electrical) which checks the furnace. The reverse action occurs when the room is too cool.

Battery for Operators' Transmitters on Magneto Boards.

Which is the cheapest battery to use on transmitters of magneto board, regardless of original cost? What amperage is usually used?

In a small office, where charging current is not available, the gravity cell is cheapest. But where direct current can be had, the storage battery is cheapest and most satisfactory. Figure on each transmitter getting one-tenth of an ampere for full time. For a single operator, three 12 ampere-hour storage cells are ample.

Telephone News

INDEPENDENT TELEPHONE CONVENTIONS

North Dakota, Devils Lake, July 9, 10; Southern Independent Telephone Association, Montezuma, Ga., July 14.

Convention of Railway Telegraph Superintendents at Detroit.

Last week the Association of Railway Telegraph Superintendents had a most enjoyable and profitable convention at Detroit, Michigan. Subjects of practical interest in connection with their work were amply discussed by members, and important changes were made in the constitution. Contrary to general expectations, the subject of train dispatching by telephone received little attention in the meeting.

The fact is that it is now so thoroughly established a feature of railway operation that there is no longer any question of the advisability of adopting it, and the whole question of telephone extension simply hinges on the time the directors shall choose to appropriate money for each contemplated addition. Of course, it will be many years before the telegraph is finally supplanted on many roads, but it is a general opinion that this time will ultimately be reached. Experience in the past year has not only shown many advantages to the road derived from telephone operation, but it has demonstrated that the telephone actually brings an improvement in the work of the men, and that the anticipated objections from the telegraphers have not been forthcoming. In fact these are among the people most pleased with the change wherever it has been put in force.

Leading manufacturers of telephone equipment and selectors for dispatching circuits exhibited their devices, and many of them attracted favorable attention while all received a thorough investigation from many of the delegates.

In the closing session of the convention, new officers were chosen as follows: President, J. L. Davis, Chicago; first vice-president, J. T. Dyer, Los Angeles; second vice-president, C. A. Cellar, Pittsburg; and secretary, P. W. Drew, Chicago.

The next convention will be held about the middle of May, 1910, at Los Angeles, California.

Plans for Closer Relationship Between Ohio Companies.

At a recent meeting of the board of directors of the Ohio Independent Telephone Association, a movement was started to place the control and management of the affairs of the United States Telephone Company, the long distance concern in Ohio, in the hands of the Independent companies of the state. The scheme has not been worked out in all its details as yet, but its main object is to present a united front against the encroachments planned by the Bell interests.

At the meeting of the board of directors, the consensus of opinion was that the company should be controlled wholly by the Independent concerns. Since they depend to a large extent upon each other, and since the United States company is the tie which can bind them together, that means has been devised to bring about a closer union. The United States company depends for its existence upon the success of the various Independent concerns which do business in Ohio, and without the Independent local telephone companies the long distance corporation would be useless.

The first step toward giving the Independents of the state more voice in the management of the affairs of the long-distance concern was taken at the last annual session of the state association, when Frank A. Davis, of Columbus, and D. J. Cable, of Lima, were added to the board of directors of the United States Telephone company. They were not stockholders in the corporation but were placed on the board of directors to look after the interests of the Ohio Independent Telephone Association.

But it was found that even with the two men on the board, the interests of the Independent companies of the state would best be conserved by placing its management absolutely in their hands. The plan is to organize a separate organization, as a side issue of the Ohio Independent Telephone Association to take over the management and not to vest it in the state association directly.

Another meeting of the board of directors will be held soon to further discuss the matter. It is believed that the change will be made during the present summer.

The reports of long distance business, since the reduction of rates among Independent companies show a slight increase in profit, notwithstanding the sweeping reductions. This is due to the natural increase in long distance business, which has been growing rapidly despite the general business depression.

New York to Again Consider Telephone Regulation.

Senator George A. Davis of Buffalo, chairman of the special legislative committee to investigate the advisability of placing telephone and telegraph companies operating in New York under the jurisdiction of the public service commissions, has called a meeting of his committee to be held in Albany on July 10. A general discussion of the committee's plans will be held at the meeting, after which an adjournment will be taken until September. At the last session of the legislature the bill to include telephone and telegraph companies under the jurisdiction of the public service commissions was not reported out of the ways and means committee, to which it had been referred for investigation.

Michigan Rural Companies Connect with Independents.

The Union Telephone Company, of Alma, has recently added six new rural lines to its list of connections, the Jasper Telephone Company of Pleasant Valley, the Farmers' Telephone Company of Coe, the St. Charles Roadway Company of Ithaca, the Stone Telephone Company of Brekenridge, the West Summer Telephone Company and the Sumner No. 1 Rural Telephone Company. The Farmers' Telephone Company of Coe was formerly connected with the Bell system.

The growth of the Union Telephone Company, under the management of W. J. Melchers, with the assistance of the other officers of the company, has been so phenomenal that the Union company ranks as one of the largest, if not the largest, Independent company in the state, with the exception of the Citizens' Company of Grand Rapids.

Kansas City Home Company Has Remarkably Good Year.

The annual report of the Kansas City Home Telephone Company, dated June 1, 1909, shows that the company increased gross earnings ($819,786.72) over the previous year by $52,840.79, while the expenses increased only $564.38, leaving a gain in net earnings (amounting to $406,251.40) of $52,276.41. Interest charges increased by about $158.48. Accordingly the company increased its surplus by $52,125.98, the amount being $255,991.36.

The Long Distance Company also made a large increase in gross earnings, which jumped from $188,266.55 to $280,-

294.85. The expenses of the Long Distance company, however, increased very considerably owing to severe storms in February, the repairs on which damage was charged to maintenance, under the sound policy of this company. Nevertheless the company shows net earnings only about $5,000 less than last year, and carries to surplus the sum of $49,344.03.

In this report the company has surprised the investors who have been familiar with its remarkable record ever since its organization, and authorities throughout the country are now more than ever ready to give this company credit for being one of the best managed public service corporations in the country.

The officers of the Home Telephone Company are: Joseph J. Heim, president; Henry Koehler, vice-president; O. C. Snider, vice-president, treasurer and general manager; and Howard L. Snider, secretary. Those of the Long Distance Company are: O. C. Snider, president and treasurer; Joseph J. Heim, vice-president, and Howard L. Snider, secretary.

Averill, of Cedar Rapids, Sells Telephone Holdings, Presumably to Competitor.

Telephone properties in Iowa, of which A. T. Averill is the principal stockholder, have just been sold to a Minneapolis broker, understood to be acting in the interests of the Bell telephone company. The holdings include the property of the Johnston County Telephone Company, including toll lines leading from Davenport, Muscatine and Iowa City; the Cedar Rapids and Marion Telephone Company, with headquarters at Cedar Rapids, and the Linn County lines and the toll lines of Linn and Cedar counties. The Vinton and Benton County Telephone Company and the Corn Belt Telephone Company, with principal exchanges at Waterloo and Vinton.

The trustee to whom the stock holdings were turned over, according to the report, is a broker named Miller, of Minneapolis. The deal was made for a cash consideration, and Averill is reported to have made a large profit by the transaction.

The Cedar Rapids and Marion stockholders received $1.10 for their stock, 84 per cent having already been turned over and the rest was rapidly coming in early in the week. The transfer was to go into effect July 1. The price paid for the Corn Belt stock was not disclosed, but it seems to have ranged in price from 40c to $1.10, according to reports from individual stockholders. The entire transaction involves payment of something in the neighborhood of $600,000, although the exact figures in such a deal as this are usually not the ones made public, for obvious reasons.

Various excuses are given to cover the motive of the transaction. One is the usual one in cases of this kind, "sentiment is adverse to two telephone systems." Another suggestion is that Averill sold out because public sentiment seemed to be hostile in a recent strike of operators, but this is not taken very seriously. As a matter of fact, the local situation discloses a state of affairs which made it immensely to the Bell company's advantage to purchase the property, even for an exorbitant price—and Averill was willing to sell for the price.

The Bell company's franchise at Cedar Rapids had expired, and the company was reluctant to go before the people asking for a new charter, as it must do under the commission form of government in operation in that city. The Independent franchise had 18 years to run, and was acquired by the transfer. Furthermore, the general manager of the Corn Belt telephone system is J. H. Shoemaker, president of the Iowa Independent Telephone Association, and, as in the case of the purchase of the Richmond, Indiana, system, the Bell company hopes to use this as a lever for changing the sentiment of Independents throughout the country. This project alone, if it could be carried out, would be worth a tremendous amount, but as a matter of fact, there is no prospect that the loss of a small corner of Iowa will do much damage to the Independent system of even that one state. The exact bearing this motive had on the transaction is not clear, but some conclusions may be drawn from the report that it is estimated that the Cedar Rapids and Marion did not sell for much more than it was worth, but the general opinion is that a handsome profit was made on the Corn Belt company.

H. A. Douglas, general manager of the Cedar Rapids & Marion Telephone Company, has a clear reputation as an up-standing Independent telephone man in spite of the transaction, as he resigned from the management of the Cedar Rapids company a few weeks ago. J. H. Shoemaker, general manager of the Corn Belt company, up to the time of this journal's going to press, had not announced his resignation of either the position of general manager of the Corn Belt company or the presidency of the Iowa Independent Telephone Association. It is not known how long he will attempt the difficult feat of simultaneously riding two horses going in opposite directions, or which way he will jump clear.

Depreciation and Rates in Louisiana.

The Shreveport, La., *Times* of May 25 prints an interesting editorial of which the following is an abstract:

"There is considerable rivalry between the Home Telephone Company of Monroe and the Cumberland company for the business of that city.

"In a statement made for the benefit of the people of Monroe the Cumberland points out the difficulties of the Independent telephone companies.

"In its statement in the Monroe case the Cumberland quotes from a report made to the New Orleans Board of Trade in 1908 by Mr. Henry Noble Hall, who was appointed to investigate the telephone question. The last paragraph of the quoted portion of this report follows:

"'By the fifth year the reconstruction period has arrived and the holders of the securities realize that the so-called profits of the preceding years were not profits at all, but should have been spent on maintenance or put aside for reconstruction. Besides, no depreciation fund has been formed and one of three things is bound to happen. The property goes to the bondholders, or preferred stock is issued, or a receiver is appointed. Within ten years every cent invested by local capitalists has been lost, and the plant has been lost also, or enough new capital has been invested to double the original cost.'

"The Cumberland has a different scheme. When the reconstruction period comes around with it, does it fall back on this boasted depreciation fund? Not on your life. It asks the Railroad Commission for authority to tax the people for the cost of needed improvements! Imagine the Cumberland telephone company criticising an Independent company because it does not spend a portion of its earnings for proper maintenance and because it does not lay aside a reconstruction fund. Are we to conclude from this that the Cumberland has a reconstruction fund? Then why is it not available for reconstructing its Shreveport system? And if it is available, why should its subscribers be made to pay interest on this money? Will the Cumberland want another increase in rates ten or fifteen years hence when it may become necessary to do some more reconstructing?

"This question of a proposed increase in the Cumberland telephone rates comes up before the State Railroad Commission at Baton Rouge tomorrow. It is not pro-

posed to increase the rates of the merchants, for the merchants would doubtless be there with an objection. Who is going to represent the hundreds of householders of this city at Baton Rouge when this matter comes up tomorrow? Who is going to protest in behalf of the poor man to whom an increase of $6 a year for telephone service means something?"

An Illinois Paper Makes Complimentary Mention of Local Telephone Company.

In the Freeport, Ill., *Journal* of June 2nd, apeared the following article on the Stephenson County Telephone Company:

"The service afforded the subscribers to this corporation is strictly first class in every respect, and the company and its subscribers seem to be actuated by the proper spirit in working together in harmony for an excellent service and a satisfied constituency. Such a spirit as that, where both parties live up to it properly, cannot fail to be full of lasting benefits to all concerned.

"The company has 2,100 subscribers to its city service, and twenty-three operators to say 'Number, please?' and give the necessary connections, business being done within a radius of fifty miles of Freeport. Since Jan. 1, 1909, 225 new city subscribers have been added.

"The company is capitalized at $150,000, and is owned by our citizens, having been built with Freeport capital; it was incorporated in 1902. Improvements are being made constantly, as needed, and there are no complaints on that score.

"The officers and directors consist of President, D. C. L. Mease; Vice-President, W. A. Hance; Treasurer, E. T. Morse; Secretary and Treasurer, L. A. Herrick. Directors: T. K. Best, Charles Knowlton, William O. Wright, F. A. Read, and Douglas Pattison."

Graduate Study at the Massachusetts Institute of Technology.

In a recent report of (then) Acting President Arthur A. Noyes, of the Massachusetts Institute of Technology, particular emphasis is placed on the advanced instruction of graduate students. Dr. Noyes points to the fuller provision now made at the Institute for advanced study leading to the higher degrees of Master of Science, Doctor of Philosophy, and Doctor of Engineering as one of the most important developments of the year. These courses are described in a bulletin entitled Advanced Study and Research, which has been issued by the Institute.

Another important movement which also supports the cause of advanced study at the Institute of Technology, has been the establishment of the new Research Laboratory of Applied Chemistry in which opportunities are afforded for research assistants and advanced students to execute investigations of chemical problems which are of interest to manufacturers. This research laboratory co-operates with the Research Laboratory of Physical Chemistry, which has been supported by the Institute of Technology for some years. It is hoped that a Research Laboratory of Applied Electricity may soon be established.

In referring to the status of the Institute instruction, President Noyes expresses his belief that there has never been a time when the teaching at the Institute was so thorough or its system of education so effective. He points out that the Institute suffers from the limited area of its site and capacity of its buildings, but in its equipment for lecture and laboratory work, which is a physical factor of especial importance in engineering and other science education, the Institute is especially well provided for. In the still more important factors of the character of its teachers, the spirit of its students, its methods of instruction, its standards of scholarship, and its ideals, the Institute is in a particularly fortunate position.

During the present Institute year graduate students received the advantages of $5,100 in awards for fellowships and graduate scholarships. Another factor of importance for graduate students is the library; and the value which is attached to it at the Institute of Technology is indicated by the fact that the accessions to the library aggregated 4,563 items for the year 1908.

The students now at the Institute of Technology who are graduates of the courses of this or other institutions, aggregate 215, and these come from 91 different colleges and universities. The largest number from any one institution besides the Institute of Technology, is 16. Many of these students are taking undergrade engineering work in the Institute classes. Others are pursuing the advanced or graduate instruction.

Amongst the total student body, 46 states and territories, besides the District of Columbia, the Philippine Islands, Porto Rico, and the Canal Zone are represented; and 30 foreign countries are also represented.

Profits from Telephones in the Far East.

The report of the directors of the Oriental Telephone & Electric Company, with head offices at London, England, for the year ending Dec. 31, 1908, states that, including £8,873 brought forward from Dec. 31, 1907, and after deducting the interim dividends of 3 per cent paid November 1 last on both the preference and ordinary shares, and making the necessary provision for redemption of the debenture stock, and other charges, the amount to be dealt with is £18,729, which the directors recommend to be appropriated as follows—viz.: in payment of a final divident of 3 per cent for the year, £8,966; to transfer to reserve account, £2,500; to reserve for contemplated pension scheme $500; and to carry forward £5,263. Notwithstanding the general depression of trade, to which the East was no exception, the directors report an increase of business during the past year, owing chiefly to the reconstruction of the company's systems, which has now been completed. The work on the several extensions referred to last year has been carried out, and will, it is anticipated, result in a further steady increase of revenue. The Indian local companies have declared the same dividends as for the year 1907—viz., the Bengal Telephone Company 5 per cent, and the Bombay Telephone Company 6 per cent—and the amounts have been included in the revenue account. Both these companies report an increased accession of subscribers, but the increased revenue is required to assist capital expenditure for some time to come. The Telegraph Company of Egypt has declared a dividend of 10 per cent for the year on both its preferred and deferred shares, which has also been brought into the account. In spite of the acute financial conditions which continue to prevail in Egypt, the revenue for the past year shows a fair increase over that of 1907. The China and Japan Telephone & Electric Company continues to make satisfactory progress both at Hong Kong and Kowloon, and the directors of that company consider the outlook favorable. As foreshadowed in the last report, that company declared a dividend of 5 per cent for the year 1907, which has also been included in the revenue account, and it anticipates continuing to pay dividends hencefoward.

Pole Consumption in 1908.

The bureau of the Census has just issued a preliminary report on the purchase of poles in the United States during the calendar year ending December 31, 1908.

Statistics relative to the production of forest products are annually collected and published by the Bureau of the Census in co-operation with the Forest Service of the De-

partment of Agriculture. Following is a table summarizing the information:

Kinds of Wood	1908		1907	
	Number	Cost	Number	Cost
Total	3,249,154	$5,928,824	3,283,268	$8,081,768
Cedar	2,200,139	3,780,973	2,109,477	5,202,617
Chestnut	516,049	1,227,273	630,282	1,619,785
Oak	160,702	95,032	76,450	60,285
Pine	116,749	382,710	155,960	459,545
Cypress	90,579	148,070	100,368	307,974
Juniper	42,367	83,401	38,925	109,226
Tamarack	24,123	32,212	13,884	10,247
All other	98,446	179,153	157,922	312,089

In common with other forest products, the output of poles during 1908, as indicated by the number marketed, showed a falling off as compared with that of 1907. The difference, however, is relatively slight, and had conditions in 1907 extended through 1908 the purchases of the later year would doubtless have reached a total substantially larger than in the preceding year. The most marked decreases were noted in the returns from the groups of purchasers comprising electric railways, light and power companies, and steam railroad companies, the total for the former group in 1908 equaling only 79 per cent and that of the latter 53 per cent of their reported totals in 1907. These were largely offset, however, by the purchases of telephone and telegraph companies, which exceeded those of 1907 by a considerable margin though the returns of some of the largest buyers in this group carried materially smaller figures for 1908. The percentages contributed to the total purchases in 1908 and 1907 were, by groups, as follows: telephone and telegraph companies, 79 per cent and 70 per cent; electric railroads and electric light and power companies, 16 per cent and 21 per cent; and steam railroads, 5 per cent and 9 per cent, respectively.

New Independent Exchanges at Minneapolis.

The Tri-State Telephone & Telegraph Company, in order to take care of its large waiting list, has decided to establish a new exchange in Minneapolis to relieve the present South exchange, the new exchange to be known as the "Sub-South Exchange." A new building will be erected for this exchange, large enough to not only take care of the overflow of the present South office, but also to take care of the growth in the South office district for some time to come.

The present "East" office will be abandoned, and the switchboard transferred to the Main office building to serve as an extension for the present Main office board. A new building has already been erected for the new East office, in which a new switchboard will be immediately installed to take care of the East Side after the old East office has been abandoned.

In the Sub-South office and, also, in the new East office new switchboards will be installed—the two boards to be alike and to fit into the general system at present in use in the Minneapolis exchanges.

Each of the new switchboards will be a lamp line signal relay multiple central energy switchboard, arranged for 40 volts battery and equipped for 1960 lines with an ultimate capacity of 10,800 lines.

Each of the switchboards will contain seven sections of the nine-panel type. The finish will be golden oak. There will be added all the latest improvements in switchboard building, and special attention will be paid to making them fire proof.

Telephone Patents

Conducted by Max W. Zabel

TELEPHONE TRANSMITTER APPLIANCE.

O. H. Goodrich, Castleton Corners, N. Y., patent 925,806, June 22, 1909, assigned to the Miniature Telephone Booth Co., New York, N. Y.

This invention is an improvement over patent No. 897,084, and consists in improvements of the individual miniature telephone booth in which a desk telephone is placed and which has an opening against which the person talking may place his mouth so that conversations are not heard by others in the same room. The present device aims to simplify the switchhook arrangements, and also to make it possible for an inspector to remove the desk telephone without changing any of the connections of the same. It aims to effect an adjustability of all the switch-operating parts to such an extent as to make the same applicable for use with telephone receivers of different weight, also with portable desk telephones where the switch-actuating arm may be located at various heights, adaptable to the different telephone sets.

POLE CHANGER.

Noah L. Wine, Polo, Ill., patent 924,712, June 15, 1909.

This pole changer consists of a constantly rotating cylinder, upon which interconnected commutating segments are provided, which are connected with a battery. The segments have springs bearing upon them for the purpose of collecting the current from the battery so they can be used to provide alternating current, or either positive or negative pulsating current.

DISCONNECTOR FOR TELEPHONE LINES.

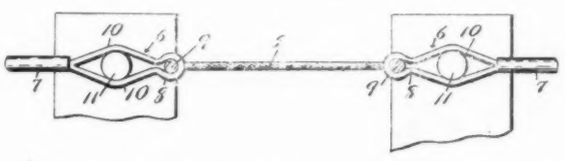
Moses Bowman, McHenry, Md., patent 925,420, June 15, 1909, one-half assigned to C. Bowman, Boynton, Pa.

In order to protect the telephone within the house, this invention contemplates means whereby the outside line conductors can be disconnected from the interior circuit. A movable weight carrying the two line conductors is arranged in close proximity to binding posts which lead to the telephone in the house, and at the same time, a rope, which also leads from the interior of the house to the weight, can pull this weight upward to make connection or release the weight to open the connection.

BATTERY CONNECTION.

O. E. Pettee, Rockland, Me., patent 924,826, June 15, 1909.

This battery connector is so arranged that the flexible conductor 5 is soldered within the circulator loop 9 of



a connector, which is provided at one end with a pin 7, so that it can be inserted in a binding post, or has two sides 10, 10 of a springy nature, which can be inserted over a post 11, for making connection as desired. The connector, therefore, is so constructed that it can be

used for connecting the flexible conductor 5 to the pin 11 or to a binding post provided with a hole.

TELEPHONE TRANSMITTER APPLIANCE.

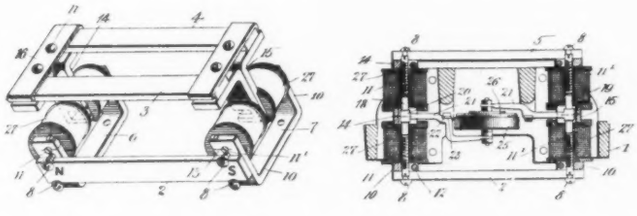
E. F. Hutton and G. A. Ellis, Jr., Bay Shore, N. Y., patent 925,775, June 22, 1909, assigned to the Miniature Telephone Booth Co., New York, N. Y.

A further improvement on the miniature telephone booths described in patent 925,806 is set forth in this invention, which provides different switchhook arrangements for connecting the switchhook of the telephone in the interior of the box with the exterior movable support of the receiver. The box, in this instance, besides having the soundproof felt lining, has the inner surface of this lining provided with a thin coating, made preferably of some water-resisting material, such as celluloid, hard rubber, mica, etc. The purpose of the lining is to give to the interior of the box the best antiseptic conditions and for enabling it to be cleansed or washed at will.

MICROPHONE.

Harve R. Stuart, Wheeling, W. Va., patent 925,609, June 22, 1909.

This microphone consists of a carbon cup 25, having its two electrodes associated each to each, with levers 21, which are mounted upon torsional springs 23, the other ends of the levers having armatures 18 and 19, which project within coils 27. Adjustable pole pieces 11 and 11' are provided within the coils 27. The coils 27 are mounted upon the U-shaped bars 7, which are connected by permanent magnets two on both sides, and which make one U-shaped bar the North pole and the other U-shaped bar, 6, the South pole. Permanent magnets 3 and 4, which have the opposite polarity, extend by means of pole pieces 14

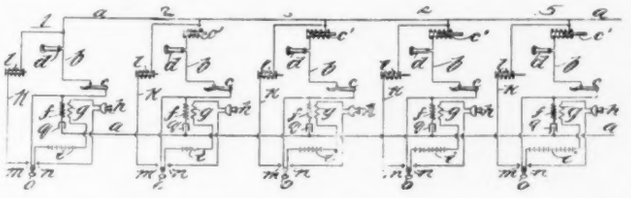


between the coils and polarize the armatures 18. Whenever currents are passed through the coils 27, one coil of each pair attracts the armature, while the other coil of the same pair repels it. The same is true of the other pair of coils, thus causing cumulative action upon the carbon cup 25 by the actuation of the levers 21, when twisting around their spring supports 22.

TELEPHONE TRAIN DISPATCHING SYSTEM.

George C. Cummings, Western Springs, Ill., patent 925,756, June 25, 1909.

The telephone circuit for train-despatching purposes here shown, consists of line wires *a-a* and the train despatcher's telephone 1, connected with substations 2, 3, 4 and 5.



Each substation has an adjustable resistance *c'*, graduated as shown, so that equal quantities of current are distributed to each substation when the despatcher is talking. Likewise, adjustable impedances *l* are used for bridging around the receiver when the substation operator is talking, thus to eliminate the necessity of talking through the receiver and the impedance coils *c'* when talking outside. The modification of the invention shows condensers of differing capacities used in place of the impedance coils *c'*.

TELEPHONE EXCHANGE SYSTEM.

Wm. A. Fricke, Chicago, Ill., patent 925,573, June 22, 1909, assigned to Monarch Tel. Mfg. Co., Chicago, Ill.

This telephone exchange system relates particularly to inter-communicating work, and consists of keys provided at each station for calling the remaining stations, the depression of one key restoring the remaining keys; and it is designed so that before any party can talk, one of the keys of the circuit upon which conversation is to be heard, must be depressed at each station. That is, the called station, for instance, does not have the battery connected to the circuit unless its home key is in its predetermined position. It is explained that this eliminates the necessity of using a great number of impedance coils. The invention also contemplates the connection of one circuit to a central exchange.

ANTISEPTIC ATTACHMENT FOR TRANSMITTER MOUTHPIECES.

E. B. Crosby, Niagara, N. Y., patent 923,950, June 8, 1909.

This antiseptic mouthpiece attachment consists of a thin strip of metal which holds a piece of felt against the inner surface of the mouthpiece. The felt contains the antiseptic material, and may be rotated throughout the periphery of the mouthpiece to disinfect it.

In the Manufacturing Field

Mr. T. W. Warner Retires from the Warner Electric Co.

Mr. T. W. Warner, well known in Independent telephone circles, has severed his connection with the Warner Electric Company and the Warner Gear Company of Muncie, Indiana, of which latter company he was secretary and general manager. Accompanied by Mrs. Warner, he will make an extended trip throughout Europe during the next two months. Recently, the Warner Electric Company was consolidated with the Warner Gear Company, and Mr. Warner has sold out his holdings in both companies.

Mr. Warner, who has been general manager of the Warner Electric Company since its organization in 1898, devoted much of his time and energy to developing and standardizing apparatus for furthering Independent telephony. He entered the electrical field at an early age and until 1894 devoted the greater part of his time to electric lighting. Soon after that time he constructed an Independent telephone system in northwestern Montana, connecting valuable mines with the outside world and building many toll lines, cutting the rights of way through the forests. Seeing the necessity of a practical and economical battery power generator, he spent much money and time in producing apparatus giving the desired result. It was just about this time, in 1898, that the Warner Electric Company was organized. It was only after much experimenting with induction, automatic and numerous other kinds of

devices that the practical and well known "Warner Pole Changer" was decided upon.

Mr. Warner is prominently connected with the Independent movement, and is a stockholder in Independent ex-

Mr. T. W. Warner.

changes at Muncie, Anderson, Elwood and Alexandria, Indiana.

Mr. Warner announces that on his return from Europe, about September 1st, he will arrange to re-enter into manufacturing business. His plans as yet are not definite, but he will continue in the manufacturing business, and on an even larger scale than in the past.

A Large Conduit Order.

A. L. Waterbury, manager of the Chicago office of the American Sewer Pipe Company of Pittsburg, recently closed an order with the Commonwealth-Edison Company of Chicago, for one million duct feet of vitrified clay conduit. Shipments on this order commence July 3 and will continue until the order is filled, at the rate of three carloads a day. Some idea of the size of this order may be had from the fact that it will take three months to ship the 250 carloads required.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., announces that it has secured the contract for furnishing new switchboards to be installed in the two new exchanges being built in Minneapolis, Minn., by the Tri-State Telephone Company; also the distributing frames, relay racks, chief operator's desk, wire chief's desk, power equipment and all other equipment necessary to make a complete installation.

The Chance Manufacturing Company, Centralia, Missouri, some time ago placed on the market a tie wire former which makes it easy to make a firm tie to an insulator of any size. The former is of convenient shape and light weight so that it may be readily carried without inconvenience to the lineman.

The Lightning Arrester Company of Danville, Ind., which was recently incorporated by E. D. Crawley, W. F. Hiatt and H. E. McHaffle, is erecting a model factory building. The lightning arresters which will be manufactured were invented by Mr. Hiatt. A number of orders for the device have already been received, among them being an order for 50,000.

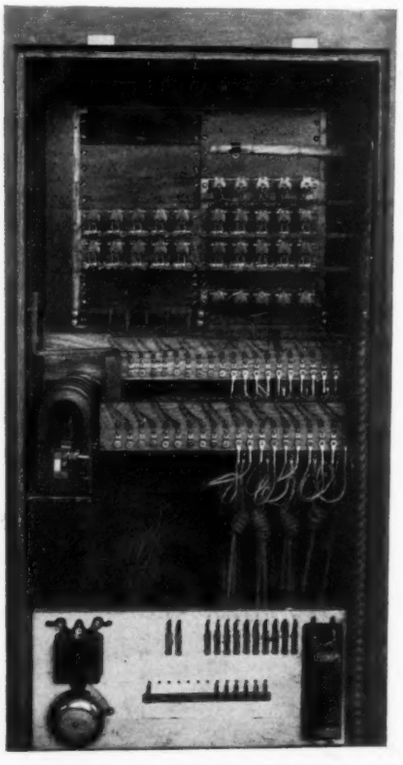
Mr. Harman S. Salt, 114 Liberty St., New York, N. Y., has been appointed New York representative of Mathias Klein & Sons, Chicago, manufacturers of linemen's and construction tools.

A New Type Kellogg Switchboard.

The Kellogg Switchboard and Supply Company has made numerous improvements in the express type magnetic switchboard which it has had on the market for the past nine years.

Probably the most noteworthy improvement is the new No. 20 drop type combined self-restoring drop and jack. The No. 20 type has all of the advantages of the old No. 3 type, with the additional features of a platinum night alarm contact protected by the shield below the shutter, and a drop coil which can be removed in a few seconds' time with a screw driver, and without unsoldering any connections. The entire operation of removing the drop coil is carried on from the rear of the board, so that it is not necessary to disturb the operator. This feature will especially recommend itself to telephone companies operating in sections of the country where trouble is experienced from lightning or high-tension circuits.

The efficiency of operation has not been the only point considered in this type of switchboard, but special attention has been paid to the maintenance of the equipment. It is a very easy matter to change any drop coil without interfering with adjoining apparatus, or in any way mutilating the cable forms. The cord terminals are conveniently located, and all other equipment such as condensers, repeating



Rear View of the New Kellogg Magneto Switchboard.

coils, induction coils, and other apparatus, is located on the hard maple panel in the rear of each position. All terminals are lettered and numbered in accordance with the blue print furnished with the switchboard.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

WINCHESTER, CAL.—The Winchester Pleasant Valley Telephone Company has been chartered to construct and operate local rural telephone lines to connect with the Home company's service. M. L. Howell is president of the new company and C. W. Patterson, secretary.

BELLEVILLE, ILL.—The Hickory Grove Farmers Telephone Company has been organized and chartered by Herman M. Eckert, Michael Muser, Henry Ahlers, Fred Deutschmann and Fred Hirth.

EUREKA, ILL.—The Eureka Farmers Telephone Company has been chartered with a capital stock of $5,000. C. J. Gibson, H. D. Schertz and A. L. Wood are interested parties.

CULLISON, KAN.—The Cullison Co-operative Telephone Company has been incorporated by J. P. Chapman, I. N. Stonestreet and others. The capital stock is placed at $7,000.

REDFIELD, KAN.—The Redfield Mutual Telephone Company has been chartered with $5,000 capital by W. B. Lee, T. L. Dougherty and others.

MILO, ME.—The Milo Telephone Company is the name of a new company organized at this place. The company is capitalized at $5,000 and the incorporators are Frank W. Hamlin and others. Mr. Hamlin is president and treasurer.

CHINOOK, MONT.—The Co-operative Telephone Company has been incorporated with a capital stock of $40,000, to construct and operate a telephone line from this place to Paradise Valley. The incorporators are Rudolph Hermes, John Brummer, James N. Cook, W. D. Smotherman and R. L. Morris.

THOMPSON FALLS, MONT.—A. S. Ainsworth and others have organized the Western Montana Telephone Company, with a capital stock of $12,500.

BUTLER, PA.—W. I. Sipe, F. P. McBride and P. S. Fennell have made application for a charter for the Fenelton Independent Telephone Company. The company is capitalized at $10,000, and Mr. Sipe is secretary and Mr. McBride, president. The line will connect with that of the People's Home Telephone Company at Chicora.

LE MOYNE, PA.—A charter has been issued for the West Shore Telephone Company, a subsidiary of the American Union Telephone Company. The general offices will be in this city and lines will be constructed from here to Camp Hill and Carlisle, New Cumberland, York, Enola and New Bloomfield. N. E. Robb, of Harrisburg, is treasurer and the incorporators are W. W. Zerby, S. K. Woodring and J. J. Bowers, of Bellefontaine. The capital stock is placed at $5,000.

LANCASTER, TENN.—The Lancaster Telephone Company is the name of a new telephone company incorporated by W. T. Simpson, Robt. Heflin, H. C. Lancaster, Jr., J. D. Fisher, M. L. Trawick, J. F. Pritchard and Tom Betty. The capital is placed at $2,500.

UNION CITY, TENN.—Citizens of Union City and Obion county held a meeting recently and as a result the Obion County Telephone Company was organized. J. C. Burdick was chosen temporary chairman and W. R. Andrews, secretary. A line will be built to make long distance connections with Paducah, Ky., and Mississippi. The company will be financed by leading capitalists of Union City and Obion county.

TOYAH, TEX.—A telephone company has been organized by B. P. Vanhorn, A. C. Vanhorn and J. V. Gage. The company is capitalized at $15,000.

BREMERTON, WASH.—Bremerton and Kitsap county are to have a new telephone system to connect with the Independent company of Seattle. The company is to be known as the Kitsap County Telephone Company and exchanges are to be installed in all the principal towns of the county. C. J. Farmer of Port Townsend and W. D. Calder of Bremerton are the principal parties interested.

POPLAR, WIS.—A farmers telephone company has been organized at this place by A. D. Brown as president; H. J. Dixon, vice-president; Fred Sandin, treasurer, and A. Le Mone, secretary, and others.

FINANCIAL.

CHAMPAIGN, ILL.—The Home Telephone Company of Champaign County has increased its capital stock from $200,000 to $250,000.

STORM LAKE, IA.—The articles of incorporation of the Northern Telephone Company have been amended increasing the capital stock of the company to $20,000.

PHILADELPHIA, PA.—The Keystone Telephone Company reports an increase in net earnings for the month of May of $1,953, and for eleven months an increase of $29,408.

NEWTON, WIS.—The English Lake Telephone Company has increased its capital stock from $21,000 to $42,000.

FRANCHISES.

MANSFIELD, ARK.—The Mansfield city council recently granted a franchise to the Boothe Telephone Company. The company will install a thorough and up-to-date telephone system in the city. The board of directors of the company is composed of citizens of Scott county, residing in Boothe and vicinity.

LATHAM, ILL.—The Decatur Home Telephone Company through Dr. J. W. Collins, president, has been granted a franchise to construct and maintain a telephone system in this place.

BELLEVERNON, PA.—The Independent Telephone Company has been granted a franchise to construct and operate a telephone system in this place. The company is tied up on the rate question, but a clause has been inserted in the franchise permitting the company to charge any rates it desires, if the bills are not paid promptly.

CONSTRUCTION.

BISBEE, ARIZ.—Larrieu Brothers, who have large interests in the Huachuca Mountains, have installed a telephone line between Huachuca siding and Fairbanks and contemplate building a line to Fort Huachuca as soon as possible.

PRAIRIE CITY, ILL.—The Adair Telephone Company has purchased and installed a new switchboard. Much better service will be given with the improved facilities.

SAVANNAH, MO.—The Mutual Telephone Company has ordered a new switchboard for the exchange in this city. The boards now in use have all drops in use and as business is increasing steadily, the new board was a necessity. Two thousand feet of cable will replace the open wires in the east part of town.

HAMILTON, MONT.—Arrangements are being made by the Montana Independent Telephone Company to install an exchange in Hamilton and provide the city and surrounding country with telephone service. In the city all wires will be placed in cables.

ASHEVILLE, N. C.—Copper telephone circuits are to be constructed from this place to Morgantown by way of Marion, by the Asheville Telephone & Telegraph Company at a cost of $7,400.

ALBANY, N. Y.—The Boston and Albany division of the New York Central Lines is preparing to install a telephone train despatching service on that portion of the line located in New York state. The probable cost is $5,000.

NEWARK, OHIO.—The United States Telephone Company is at work installing additional long distance lines in the state. On account of the financial conditions this work was discontinued for about two years, but the local companies have grown so steadily and rapidly that long distance facilities have become inadequate for the handling of the long distance business turned over to them. In Newark, the Citizens Telephone Company has increased 50 per cent in the last three years, and recently its toll facilities have been nearly doubled so that long distance calls can now be promptly handled.

BUTLER, PA.—The Peoples Telephone Company is making many improvements to its system this summer. At present men are engaged in extending a line into an entirely new community, giving communication with Coiyesville, Fennelton, Rattigan, Sugar Creek, Nicola, Kaylor and the Clearfield district. All copper circuits are being put up and lightning protection is installed on all telephones.

BELLINGHAM, WASH.—During the coming summer the Home Telephone Company will expend about $25,000 in improving its telephone system in Whatcom county. Five carloads of cables, wire and other equipment have been ordered. In Eureka additional cables will be installed to relieve the congestion in that portion of the city. It is reported that the lines of the Farmers' Mutual Telephone Company, connecting Bellingham with outside points will be double-trunked. New telephones are being installed on these lines and for that reason the improvement was a necessity. On Sylvan street wires will be placed underground, 400 pair cable being used.

BOTHWELL, WASH.—The Independent Telephone Company has purchased property on Main street, and a substation is to be installed in tne building which the company will erect. Several years ago a toll station was installed in this city but no local service was given. However, patronage has grown so large that the company deems it a good plan to install a local switchboard.

TACOMA, WASH.—The Home Telephone Company of Puget Sound is planning many improvements to its system, the probable cost being $100,000.

ELECTIONS.

DELAND, FLA.—The Deland Telephone Company held its annual meeting recently and elected officers as follows: J. B. Conrad, Glenwood, president; M. G. Rowe, secretary-treasurer and superintendent. Directors, J. B. Conrad, Glenwood; Frank S. Taylor, Orange City; Robt. H. Boyd, J. B. Taylor and M. G. Rowe, De Land.

RATHDRUM, IDA.—The stockholders of the Rathdrum Rural Telephone Company No. 1, at their annual meeting, elected officers as follows: M. G. Deitrich, president; T. N. Feely, vice-president; G. A. Laird, secretary; W. E. Fehlhaber, treasurer.

BRADFORD, ILL.—Stockholders of the Empire Telephone Company have elected these directors and officers: Cyrus Bocock, George A. Carper and P. N. Mason for a term of three years, and Charles Austin, James A. Briggs, Edgar B. Hill and J. E. Mouier. Cyrus Bocock was chosen president; James A. Briggs, vice-president; secretary, John H. Drawyer and Charles Austin, treasurer. This company is very prosperous and 4 per cent dividends are paid semi-annually. The company operates three exchanges and has 1,020 telephones installed.

COLUMBUS, IND.—The annual meeting of the stockholders of the Citizens Telephone Company was held recently and C. S. Norton was elected president; William Fortune, vice-president; E. V. Hanes, secretary, and John L. Hosea, general manager. Some improvements and extensions were decided upon and will be made this year.

BENTON, IA.—E. S. Anderson was elected president; W. T. Snyder, vice-president; Ward Carpenter, secretary; A. G. Rosa, treasurer; J. W. Rosa, J. L. Scales, O. Smith, H. A. Gookin and E. S. Anderson directors of the New York & Russell Telephone Company at the annual meeting.

GLENWOOD, IA.—Officers elected to serve the Independent Telephone Company at this place are: F. J. Day, president, Council Bluffs; Dr. W. M. Plimpton, vice-president, Glenwood; T. G. Turner, treasurer, Council Bluffs; and C. A. Laubauch, secretary and manager, Council Bluffs. The directors are B. B. Dean, W. M. Plimpton and J. T. Ward, Malvern; C. G. Greenwood, Silver City; H. B. Jennings, F. J. Day, T. G. Turner, C. A. Beno and C. A. Laubauch.

CLIFTON, KAN.—The officers elected to serve the Sherman Co-operative Telephone Company are: V. A. Stewart, president; C. D. Stewart, vice-president; J. G. Miller, secretary, and G. W. Stewart, director.

KINGMAN, KAN.—At a meeting of the directors of the Kingman Independent Telephone Company the new manager, Mr. F. M. Hageman was elected secretary and treasurer. Toll connections have now been instituted between this place and Kansas City and points in eastern Kansas, Missouri, Iowa and Nebraska.

ST. PETER, MINN.—Stockholders of the Nicollet County Telephone Company have elected officers as follows: M. L. Klein, St. Peter, president; C. C. Nelson, New Sweden, vice-president; C. W. Carpenter, St. Peter, secretary and manager. F. M. Donalhower, St. Peter, treasurer. A 4 per cent dividend was declared.

WRIGHTSTOWN, MINN. (R. F. D. from Parkers Prairie).—The Hewitt and Wrightstown Telephone Company held its annual meeting recently and the following directors were elected: A. S. Lesemann, Alfred Naylor, E. R. Bartlett, Bradley Turner, Peter Johnson, H. P. Ackerman and George Moats.

ELGIN, NEB.—At the annual meeting of the stockholders of the Antelope County Mutual Telephone Company, directors were elected as follows: O. M. Hays, E. J. W. Evans, August Mueller, J. C. Ferguson and E. W. Durham. The directors chose O. M. Hays as president; J. C. Ferguson, treasurer, and E. W. Durham, secretary.

LINWOOD, NEB.—At the directors' meeting of the Linwood Telephone Company held a short time ago, the following officers were elected to serve for the ensuing year: President, Frank Faytinger; vice-president, Emil Folda; secretary, A. A. Hayek; treasurer, J. B. Tichacek, and manager, Chas. Homolka.

CALDWELL, OHIO.—Stockholders of the Farmers Telephone Company met and re-elected the old officers, and added to the list of directors J. D. Gore, N. F. Schott and C. A. Graham.

WAYNESBURG, PA.—The annual meeting of the stockholders of the Green County Telephone Company was held and the following directors elected: W. F. Scott, Eli G. Bailey, Thomas Hughes, Challen W. Waychoff, Roy J. Waychoff, J. N. Scott, J. F. Bailey, F. F. Bayard and Charles F. Randolph. The directors organized by electing J. N. Scott, president; Thomas Hughes, vice-president, and J. F. Bailey, secretary and treasurer.

VERMILLION, S. D.—The annual meeting of the A. B. & E. Telephone Company was held recently and the following officers were elected: President, J. E. Johnson; vice-president, W. M. Hansen; treasurer, C. H. Jacobson; secretary and manager, A. S. Anderson. A dividend of 6 per cent was declared on the capital stock of the company for the two years ending June, 1908, and June, 1909. During the eight years that this company has existed it has grown from one toll line to 24 rural lines, each with 10 to 20 parties on the line.

SOUTH CABOT, VT.—The annual meeting of the Mollys Falls Telephone Company was held recently and directors were elected as follows: O. H. Smith, Marshfield, Vt.; M. E. Beckley, Groton, Vt.; A. R. Taylor, Groton; F. L. Wallbridge, Cabot, and F. G. Shaw, So. Peacham, Vt. O. H. Smith has been chosen president; F. L. Wallbridge, vice-president; A. T. Davis, of Marshfield, secretary, and M. E. Beckley, business manager.

JANE LEW, W. VA.—At a meeting of the stockholders of the People's United Telephone System, held recently, Dr. F. F. Farnaworth was elected president of the company; M. J. Kester, vice-president; John E. Batten, secretary-treasurer; S. S. Talbot, George A. Davis and S. G. Hall, with the officers, constitute the board of directors.

BIG PINEY, WYO.—At the annual meeting of the North Piney Telephone Company, Henry Budd was elected president and S. Shidler business manager of the company.

MISCELLANEOUS.

PHOENIX, ARIZ.—The Home Telephone Company will have its local system completely installed by the 1st of October. The Overland Long Distance Telephone Company, recently incorporated in Oklahoma, has five crews of men working in northern Arizona and its line running into Phoenix will be completed about the same time.

LAKE CITY, ARK.—It is reported that the People's Telephone Company, of this place, in which Floyd Smith, Preston Hatcher and L. W. Fielding are interested, has purchased the Monette Telephone Company of Monette for a consideration of $2,500. The system will be combined with that of the former, possession to be taken the first of next year.

VILLANOW, GA.—M. Gordon Keown, president and general manager of the Armuchee Telephone Company, has purchased the lines and equipment of the Sugar Valley Telephone Company, and will carry on operation of this system. He is planning numerous extensions in the near future.

CLINTON, IA.—The automatic system which was installed in this city by the Tri-City Telephone Company was put into operation recently. It is expected that this system will prove a great improvement over the old system, which had become greatly impaired.

HUMBOLDT, KAN.—C. Heim and Harry Kelly, owners of the Humboldt Telephone Exchange, have sold it to F. M. Campbell, of Yates Center, for a consideration of $25,000.

PITTSBURG, KAN.—The Citizens' Home Telephone Company of this place has made application to the town of Parsons for a new franchise.

KNOB NOSTER, MO.—The Johnson County Home Telephone Company has just issued its new directory for this place and Warrensburg. The company is in excellent condition financially and otherwise. It started seven years ago with 150 subscribers and now has about 1,325.

BEATRICE, NEB.—A deal has just been consummated whereby the Lincoln Telephone & Telegraph Company becomes the owner of the Independent exchanges at Beatrice and Wymore. These properties have been operated and owned by the New Home Telephone Company of Beatrice, and will still continue to operate under a separate corporate name but will be entirely controlled by the Lincoln Telephone & Telegraph Company. It is reported that Mr. W. H. Caman will continue as manager of the Gage county exchanges.

HYDRO, OKLA.—N. T. Bryan has sold his interest in the Hydro Telephone Company to J. O. Rinearson and J. D. Palmer.

NEW CASTLE, PA.—The Slippery Rock Telephone Company, New Wilmington, New Bedford, Plain Grove and Black Town Telephone Companies have just issued a very handsome directory of their subscribers, containg about 1200 names. There are seven exchanges represented in the directory.

PHILADELPHIA, PA.—Mr. John I Bishop has been elected a director of the Keystone Telephone Company to fill the vacancy left by the death of Mr. Jacob E. Ridgway.

PULASKI CITY, VA.—The Virginia & Tennessee Telephone Company has amended its charter changing the location of the principal office from Pulaski City to Roanoke, Va.

TACOMA, WASH.—It is announced by the general manager of the Home Telephone Company of Puget Sound, that the general offices have been transferred from Portland, Ore., to Tacoma.

WINNIPEG, MAN., CAN.—The Manitoba Government Telephone Commission has purchased the plant and lines of the Turtle Mountain Municipal Telephone System.

TORONTO, ONT., CAN.—The city council has asked the Railroad Commission of Canada to look into the rates charged by the Bell telephone company, particularly those in the suburbs, which the council claims are exorbitant.

WOODSTOCK, ONT., CAN.—The Farmers' Telephone Company is building a telephone line from this place to Hartland.

DRINKWATER, SASK., CAN.—The secretary of the Golden Flat Telephone Company of this place recently advertised for bids on the construction of a telephone system for the company, the line being about 21 miles in length.

REGINA, SASK., CAN.—The Government has purchased the plant and equipment of the Saskatchewan Telephone Company, having headquarters at Moosejaw, Sask., for a consideration of $150,000. This system includes exchanges at Moosejaw, Estevan and about 260 miles of long distance lines. With the exception of a few local companies, the government now owns all the telephone systems of the province.

UNDERGROUND.

WARREN, ARK.—The Valley Telephone Company is putting a good portion of its system underground, all wires in the main streets being placed in underground conduits.